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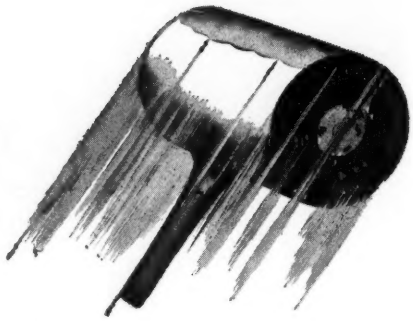
Vol. 35
No. 24
Whole
No. 1623

DRUMS OF DEATH



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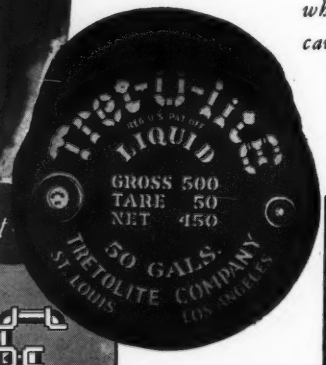

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OIL WORLD
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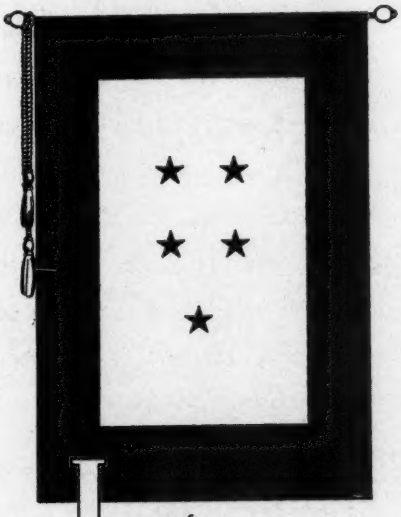
SECOND ISSUE
DECEMBER 1942
VOL. 35 NO. 24
WHOLE NO. 1623

IN THIS ISSUE



In the service of our country

Administrative Highlights 5

Certain Aspects of Cooling Tower Design and Operation 13

Los Angeles Developments 29

Coastal Developments 31

San Joaquin Valley Developments 33

PETROLEUM PUBLISHERS, INC. 939 SO. BROADWAY BLDG.
LOS ANGELES, CALIFORNIA-MEMBER OF THE AUDIT BUREAU OF CIRCULATIONS

WALTER C. MONROE — President and Editor
KINZIE MILLER — Vice President

V. W. HEINZERLING, Manager California Oil World News Service and California Oil World Reference Edition

California Oil World and Petroleum Industry is published twice a month at 1009 in the 939 So. Broadway Bldg., Los Angeles, California. Entered as Second-class Matter January 16, 1937, at the post office at Los Angeles, California, under the Act of March 3, 1879. Subscription price $1 per year in U. S. and Possessions, $2 in foreign countries, including Canada. Member of the Audit Bureau of Circulations.

December 28th, 1942

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Administrative Highlights •

Speech of Deputy Petroleum Administrator for War

RALPH K. DAVIES
at the
Biltmore Hotel, Los Angeles, California
December 16, 1942

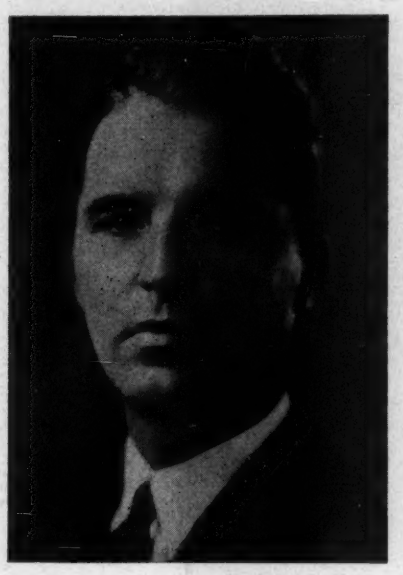
CALIFORNIA OIL—AND WAR

When our good friend, Ernie Pyles, extended me his kind invitation to address you upon this occasion, he said that one of the reasons why I should accept was that my California friends thought it was about time that I was getting away from my desk in Washington.

Now there were two ways in which I could have interpreted that remark: either Ernie meant that I needed a rest, or else this was just his way of removing another bureaucrat from the Washington scene.

Be that as it may, I did accept Ernie's invitation, in grateful anticipation of enjoying once again the privilege of personal, rather than long-range, association with my friends and acquaintances of long standing: the men of the California oil industry. And, so, I am sure that you know that I regret very deeply the circumstances which forced me regardless to remain at my job, and I can only hope for better fortune at a later time.

Mr. Knowlton, Director of our Production Division, is attending your meeting, and I am sure the office will be adequately represented through him. Mr. Knowlton and Mr. DeGolyer have given the closest attention to problems of California production here, and you will find them both well informed and sympathetic. I should very much appreciate your making known to Mr. Knowlton on this occasion, that he may on his return relate your observations to me, in what ways you believe our office can be of greater assistance to the oil industry of California in its efforts to meet the Petroleum responsibilities which devolve upon it during this war. Both the Administrator and I shall welcome your comment and suggestions, and assure you they will receive most earnest consideration at this end. We make no claim to having attained perfection in our administration of oil affairs in Washington but continue to strive for improvement. To this end the industry viewpoint is of the greatest assistance, and you will be serving genuinely the great common cause through speaking up and making known your thoughts and proposals.



R. K. Davies

Among the several developments which hold me in Washington today, not the least, is the new Executive Order which issued on December second and created the Petroleum Administration for War supplanting the old office of Petroleum Coordinator. Additional responsibilities are imposed by this order and new organization problems grow out of it. We are at the moment engaged in redefining our relationships with other agencies, making certain changes internally and otherwise preparing to adjust ourselves to the requirements of the new arrangement. Out of it all will come a more comprehensive, stronger and more effective central direction of petroleum affairs enabling both government and industry to do a better job in oil during the war. Intelligent, well-organized governmental direction is an absolute essential to attaining the objective which we share. Likewise, on the basis of a partnership with industry which has been our plan from the very beginning, it is equally essential that the industrial organization operate as a well-knit, smooth-running unit. The combined effort cannot be successful if there is inefficiency or lack of understanding in either quarter. On the government side of establishment of the Petroleum Administration for War under the President's Executive Order of December second will go far toward enabling us in Washington to meet such specifications. The Executive Order, in addition to centralizing in the Administrator all of the Federal functions dealing directly with oil in this time of war, empowers the Administrator to exercise, by way of statutory orders issued in his own name, all of the authority and discretion conferred upon the President by the priority and allocation provisions of the second war powers act.

This sweeping delegation of statutory powers to the Administrator is particularly important as applied to the production branch of the oil industry. For although oil men have generally thought of priorities and allocations as applicable only to materials received by the oil industry, it must be remembered that petroleum itself is a critical material, essential for waging war and main-

—Photo courtesy Los Angeles Herald & Express

Seated at right: Henry J. Kaiser, principal speaker at the California Oil and Gas Association's "Wildcat Christmas Benefit". Seated at left: Reese H. Taylor, president, Union Oil Company of Calif. Standing, left to right: Lieut. Comdr. F. D. Higbee, U. S. Coast Guard; Capt. Edward McCauley, deputy war shipping administrator; Charles Jones, president, Richfield Oil Corporation and Capt. James Irvine.

taining all industry, and as such just as much susceptible of regulation and allocation for the purpose of assuring and stockpiling necessary supplies as any other commodity.

In production, two fundamental points stand out in bold relief. With current production, the place to maintain a crude oil stockpile is in the ground—both to avoid underground waste in its recovery, and to save critical materials and losses entailed in excessive above-ground storage. With future development and production, unit or cooperative operation must be the rule—again both to save critical materials in drilling and to assure maximum recoveries with a minimum use of these same materials. The new executive order, by granting to the Administrator, clear cut and definite powers to allocate and, if necessary, suspend the delivery of crude oil from all wells or fields, provides the means whereby materials may be saved by efficient as contrasted with inefficient use, and crude oil itself properly stockpiled in the ground. And all that has been said with respect to crude oil, under the terms of this executive order, applies equally well to natural gas regardless of whether it be produced with oil, or from so-called "dry" gas fields.

In California, the road has been cleared for a proper application of the Executive Order by the excellent work of the Production Committee for this District which has operated under the Coordinator's Recommendation No. 19 in preparing for his direction allocations of current crude production from oil wells and fields in this state. In this effort, the Production Committee has built upon the prior work and had the appropriate financial and mechanical assistance from the Conservation Committee of California Oil Producers. Month by month the resulting schedules have issued over the signature of the Coordinator. It is our intention that this should continue, only now these schedules will become directives with the force of the new Executive Order behind them compliance with the crude oil allocation schedules as recommended by the Production Committee and in the form finally directed by the Coordinator has, on the whole, been excellent. This has been due both to the honest and objective job which the Production Committee has done and to the sincere patriotic desire of the overwhelming majority of the California operators to assist the war program of the nation. A few instances have occurred, however, where an individual operator has deliberately placed private profit above the needs of the nation. In the future, under the powers granted in the Executive Order, the Petroleum Administration can and will protect the overwhelming majority who are complying with the allocation schedules, by issuing suspension orders against any few who flagrantly ignore proper rates of production. And here let me add, that the less frequently we are compelled to use these executive powers the better we shall like it and the more credit it will reflect upon the oil industry as a whole. But you will understand that we have a job to do and that there is no closing our eyes to acts which interfere with our doing that job. The Executive Order confers powers, but it likewise assigns responsibility. The Petroleum Administration—and here I include its industrial committee organization—

has as a war assignment the responsibility for seeing to it that the oil resources of our country are developed and utilized in manner best calculated to serve the war-time requirements of the nation. Obviously, production practice is of the most vital concern in this connection.

More than forty years ago, W. L. Hardison, an outstanding pioneer in this industry and one of the founders of the Union Oil Company, is reported as summarizing conditions with regard to production in California thus: "There is not much trouble in finding oil. The trouble is in finding a market and in knowing what to do with it." This search for market—for outlet for production was characteristic of the early industry of this state and has continued to be one of the main problems to within very recent time. In my own experience in the oil industry in California over the past 30 years it seems to me the principal problem was always one of finding markets. I remember we used occasionally to talk about the possibility of a future crude scarcity, but it never seemed to arrive and the pressure always remained upon the Sales Department.

All this has radically changed. Your problem is no longer one of finding markets. The nation needs your oil in quantities and with an urgency that has never before been experienced. The war in the Pacific must be fought largely with California oil. Battleships, planes, tanks, trucks—all transport—must be fueled with it. It may well be that victory, an early victory we hope, will be gained through our superior ability to provide the necessary oil products to our military forces in this area. The problem has shifted. It is no longer one of developing demand for crude; it has become one of keeping our productive capacity at so high a point that we will be able to meet the great and unprecedented demands which may be made upon it. This involves successful exploration for additional productive capacity.

Your problem of finding additional reserves through the discovery of new fields has become increasingly difficult. The known oil-bearing regions of the state always have been comparatively small and compact. As new methods of prospecting have come into operation, the same areas—the Los Angeles Basin, the San Joaquin Valley, Ventura and the transverse ranges, and the Santa Maria Basin and the Southern Coast ranges—have been surveyed and examined again and again. As drilling to increasingly greater depths has become feasible, prospects which fail at shallower depths have been redrilled, often with favorable results.

On the speakers platform at the afternoon session, reading from left to right: E. E. Pyles, Chairman of the Production Committee for District Five; Mr. L. A. Cranson, member of the Production Committee and Chairman of the Gas Conservation Subcommittee; Mr. L. L. Aubert, member of the Production Committee and Chairman of the Joint Use of Facilities Committee; Mr. D. R. Knowlton, Director of Production, Petroleum Administration for War; Mr. C. L. Moore, Los Angeles Office of the Petroleum Administration for War; Mr. Mortimer Kline, Associated Chief Counsel, Petroleum Administration for War; Mr. R. P. Huggins, Chairman of the Conservation Committee of California Oil Producers.

Results of exploration within recent years have been discouraging. No great additions to California productive capacity have been made since the discovery of the Gatchell Sand at Coalinga and of Coles Levee in 1938, the discovery of the Terminal Zone at Wilmington in 1936, and the group of prolific fields in the Valley discovered from 1936 to 1939 with the aid of the reflection seismograph.

It is noteworthy that all of these fields, with the single exception of the deep Coalinga Field, were discovered with the aid of seismic reflections. I am advised that the available areas have been examined with this method—indeed, I understand that there are townships in the San Joaquin Valley which have been surveyed as much as thirty-five times. Very few prospects are reported to have been found within the last year or two and we seem to be faced with the necessity of taking l o n g e r chances in our exploratory work than has been necessary in the past. None of you would agree with me if I said that, except for reserves largely known at present, California is through as an oil state. None of you would agree that there are not great and important fields yet to be found. Our problem then is to find this additional oil as soon as possible. We discuss our oil-finding and the rate of finding each year. We count the number of wildcats and footage drilled and shake our heads gravely over the inadequacy of the results obtained. Again I say—our problem is to find additional oil. If it cannot be done with 124 wildcat wells per year such as were drilled in 1941 let us drill double the number or even more. The magnitude of the effort should be great enough to get the required results. I am not a technical man but I am advised that the greatest opportuntiy to find additional reserves in California is likely to be through the discovery of stratigraphic trap types of fields and that the exploration for such fields is likely to cost much more in dry holes than the structural trap type of pros-

pecting which has occupied most of our attention in the recent past. If your technical men agree that this is the case, let us get it done, and now. I am sure that your petroleum geologists have studied this problem and are prepared to make recommendations. The odds are longer, but the game is one which must be won.

I have few specific and almost no technical recommendations to make. If there are blocks of leasehold covering attractive prospects which are not being drilled as a result of conflicting or diversified ownership, sink your differences. Get together either in unit or as a cooperative enterprise and drill the necessary wells. Be bold and vigorous in your prospecting effort. If odds are longer than they have been it is doubtful if they will ever shorten. Use new methods, if you can find them. Use the old methods until their possibilities are exhausted. Use new viewpoints. Reappraise existing data, geological and geophysical, in the light of a new, a braver and a bolder viewpoint and be prepared to drill prospects which appear to be less attractive than those which you have drilled in the past. After all, great fields have been found on the basis of prospects of mediocre technical quality.

A few words about the possibilities of unit operation in the production branch:

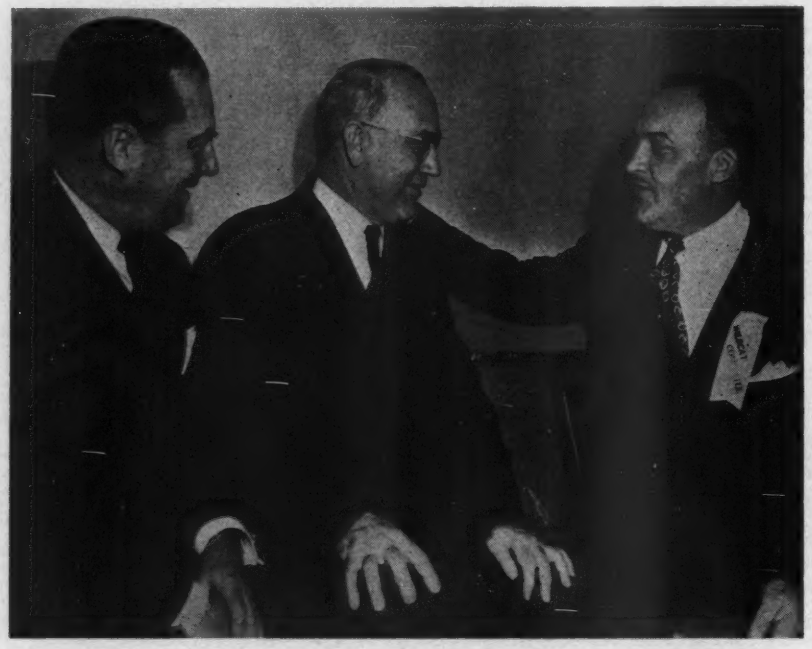
We are faced today with shortages in manpower, with shortages in equipment and material, and with a pressing demand for both oil and gas. From the standpoint of saving in labor and in materials and power alone, unitization offers economies which we cannot neglect. Our ideal in this direction is for the operation of entire fields as units. We cannot afford the material and men necessary to drill and operate a single well to protect a lease or an equity and particularly, as we are considering zonal-spacing for this state, we cannot be hampered nor waste critical material because of the difficulties presented by diversified ownership.

On broader grounds—those of recovering the greatest possible amount of oil and gas from a single pool—the advantages of unit operation are beyond dispute. The engineers of the industry know this. Their whole science of reservoir management is based upon it. Faced with declining reserves and increasing demands, it is obviously imperative that production practice be of the most efficient sort. Public interest demands it and both lease owners and royalty owners must recognize it.

I am pleased to note that the advantages of unit operation are receiving recognition by the oil producers of this state. I am advised that Coles Levee and Rio Bravo are practically unitized, that plans for the necessary and unescapable unitization of Paloma are well under way and that serious consideration is being given to the unitization of other important fields.

It is our hope that the interested parties in fields which should be unitized will be able to get together and adjust their interests to permit such unitization. Each field is a unique problem and each unitization project is or should be a tailor-made job. We have no magic formula for the adjustment of viewpoints but we are confident that it can be done equitably by engineers and executives who made a serious effort to do it. We are prepared to put the full force of our office behind such effort and here again, I may say that the Petroleum Administration of War with its executive order of December 2nd is much better prepared to give support to this kind of effort than was its predecessor, the Office of Petroleum Coordinator.

I know you are interested, and justifiably so, in the problem of price, for your heavy crude production, in particular. The importance of this question is well understood in Washington. It is perfectly obvious that the supply of fuel oil base crudes in the Pacific area must be increased if the war requirement is to be met —and it must be met. The price factor must be considered in this relation, and while I cannot at the moment say specifically what the conclusion of our office will be and what revisions in schedules we will recommend to the Office of Price Administration, I can tell you our work on this subject is within days of completion. In fact, Monday of



—Photo courtesy Los Angeles Herald & Express

Three officials of Standard Oil Company of Calif. are shown above. Left to right: George J. O'Brien, assistant to the president of Standard Oil Co.; R. C. Stoner, vice president and director of the company; and Floyd S. Bryant, director.

this week a group from the Pacific Coast area came to Washington at our invitation to participate with us in our final deliberations, and they are so engaged at the present time. We here are convinced that some upward adjustment is desirable to implement in a practical way the policy of increasing heavy oil production. Only details remain open so far as concerns our conclusions.

Fortunately, a good deal of the erroneous thinking on the score of California production has now been corrected and a more realistic view prevails. I no longer hear the exaggerated claims of the past as to virtually inexhaustible supplies of crude available from California fields. Remember it was not much more than a year ago that the California Oil Umpire, for purposes of proration, set the State's ability to produce at 3,000,000 barrels daily. Today everyone acknowledges that any such figure is utterly fantastic. In fact, in field after field, when there has been a call to increase production rates to meet ever-increasing war demands, it has been found to be impossible even to approximate "book" potentials—at least without ruinous damage. The most careful studies by thoroughly competent production experts today indicate that the oil fields of California capable of producing the required crudes are now being operated at Maximum Efficient capacity. The best judgment of these experts is that 750,000 to 800,000 barrels per day is probably as much as can be expected from known reserves in California over any extended period of time. To have corrected the misconceptions of the past as to the sustained productive capacity of California reserves is a prerequisite to straight thinking and practical action.

The California producer has been given one of the most important war assignments. He has been called upon to protect with petroleum supplies, not alone the military operations, the war industry, and the essential civilian activities of the entire Pacific Coast but of the whole war area of the Pacific as well. It is an assignment to test the capacity of both resources and men. Upon its success depend great things. Nothing less than the outcome of the war is bound up with the operation of the petroleum industry in California. Let us never forget that human lives are daily at stake. Oil has taken on an entirely new value. Perhaps it will be the additional barrel of production from your lease that will, when margins are narrow, be the barrel that gets the fighter plane back to its base or spells the difference between success or failure in an attack.

From my years as a member of the California industry, I share your intense pride in its great accomplishments. I know, as you do, that it can always be counted upon to rise to the occasion. That it will in the present great emergency acquit itself with distinction, I have not the slightest doubt.

Address of D. R. KNOWLTON to the California Oil Operators at Los Angeles, California, December 16, 1942

Many important developments in the war program have transpired since I talked to you gentlemen last April. The petroleum industry faces a tremendous responsibility to supply the necessary war products at the right time in the right places.

One long-standing axiom that has gone by the boards in this war is the one about the Army traveling on its stomach. This may be partially true but we do know that it can't travel fast enough these days on its stomach alone. Today's mechanized armies move on oil. The best T-Bone steak that ever came out of Kansas City would not budge a General Grant tank. Yes, the old adage has given way to the new. Today an army travels on petroleum. As a matter of fact, petroleum products make up two-thirds **nearly 70%** by weight of all the material that must be taken to the battlefront. The movement of men, arms, and equipment from our shores to the far-flung battlelines of a global war is a big part of the problem, too, and it is mainly dependent on oil.

I don't think it is necessary for me to spend any time telling you the importance of oil to our war program. I think you are as aware of that fact as anybody in the world today—save one man. He goes by the name of Marshall Rommel. I believe he would have given his right arm, and his left arm, and his rights

—Photo courtesy Los Angeles Herald & Express

Left to right: L. L. Aubert, president, Bankline Oil Co.; Chas. Gregerson, The Texas Co. and Colonel F. E. Foster, manager, Calif. Oil & Gas Assoc.

—Photo courtesy Los Angeles Herald & Express

Shown at this table are left to right: R. A. Broomfield, Sr., former president of Barnsdall Oil Co.; Earl B. Gilmore, president, Gilmore Oil Co.; C. E. Houchin; E. F. Davis and L. G. McLaren, vice presidents of Shell Oil Co., Inc., and F. C. Ripley of C. C. M. O. Co.

and lefts of anything else, to have had the oil he needed during these last few weeks. What I want to talk about is how and where are we going to get it?

Although I got my early experience in California oil fields, I have spent my recent years in the Mid-Continent. There I got used to hearing and using an expression that fitted into the oil man's language almost as if it were a single word. You know what I mean—like the people from Dixie growing up without knowing that "damn Yankee" is two words. The expression I learned was "East of California." All the production statistics we considered, wells completed, wells started, barrels per day of production, quantity of oil in storage, runs to stills, everything listed, was suffixed by the term "East of California." California was a petroleum economic domain in itself.

That situation still exists today. The California petroleum economy is still segregated from that of the rest of the United States. A flow stream from the oil wells, to the gasoline tank or the ship bunker, is seldom contaminated with petroleum from an outside source.

This distinction carries with it a tremendous responsibility in this war. The bulk of the petroleum for the conduct of the Pacific War must come from California. I know you recognize this tremendous responsibility and I want to take this opportunity to acknowledge the very excellent way in which you have gone about the job of furnishing the needed oil. But there's still a big job to do.

I didn't have to come to California to know that everyone of you is anxious to turn full throttle on a drilling program so as to do your best to eliminate any possibility of an oil shortage. I would like to see you do it. We all realize, however, that the problem is not that simple. In this all-out war program there just isn't sufficient steel to carry out all the production schedules we would like to have. If the Navy had more steel they could build more ships; if the Army had more steel they could build more tanks; if the Lend-Lease Administrator had more steel he would send more steel to Russia; if the Board of Economic Welfare had more steel it would send more steel to South America; if the Refining Division of the Petroleum Administration for War had more steel, more refineries would be built. Likewise, we need more steel for synthetic rubber, armaments, and munitions. The simple, inescapable, fact is there isn't enough steel to go around.

The job of allocating the available steel to the various uses for which it is sought lies with the War Production Board. Gentlemen, this is a tremendous responsibility, and one in which the War Production Board is meeting in a highly commendable manner.

The petroleum industry isn't getting all the material it is asking for and it will probably be some time before it does. We will just have to do the job with what we get. The Petroleum Administration for War is determined to do its utmost in making the greatest quantity of petroleum available with what material we receive. We want it never to be said that the war program was retarded by lack of oil. In this resolve I know we have the 100% backing of the petroleum industry.

An examination of the data on crude oil reserves of the United States presents a very disturbing picture. In terms of demand, there has been a constantly diminishing supply during the past 10 years. For instance, in 1933 there was an indicated supply, for the demand at that time, of 22 years; while presently there is an indicated supply of less than 14 years of present demand. There is a strong possibility that this demand will be substantially increased. We should have an indicated supply of from 15 to 20 years in order to insure an adequate sustained supply under reasonably efficient operating conditions. It is even more alarming to note that we have actually been producing oil faster than we have been finding it for the past several years. During the first half of 1942, new field discoveries added only an estimated 150,000,000 barrels to our proven reserves while production for that same period was 680,000,000 barrels. Although the number of wildcat wells drilled has been maintained at a high level, and the actual number of new fields discovered has been high, the amount of oil found has been constantly decreasing because

of the smaller size of the new fields. This means that we will have to drill more wildcats in the future to find the same amount of oil that we have found in the past.

This year we are going to drill approximately 3100 wildcat wells—not nearly enough. Our supply of underground reserves is dwindling toward the danger point and there is only one way to stop the trend—more wildcat wells must be drilled. We should have a minimum of 4500 wildcat wells drilled during the coming year, and even more will be highly desirable.

The same story which applies to the Nation's reserves also applies to the California reserves. I need not tell you how demand is crowding supply in California. I need not recount for you the dismal results which we have had from exploration in California. I need not tell you how important it is that we augment our petroleum resources on the West Coast.

You have heard arguments to the effect that the West Coast petroleum supply should be augmented by a pipeline across the mountains from New Mexico and West Texas. I say that that would be a last ditch measure. The way to augment our petroleum resources in California is to find more fields in California, and the way to find more fields in California is to drill more wildcat wells. Let me assure you of this: All the support and assistance that we can possibly give is available to you in getting wildcat wells drilled.

We are acutely aware of the fact that your manpower troubles are as serious as your materials difficulties. Then manpower situation in California petroleum operations is more serious than in other parts of the United States. While the President's Executive Order establishing the Petroleum Administration for War does not give us any authority whatever over manpower, it very definitely pins the entire responsibility for governmental actions with respect to petroleum on our office. As a result, we have the obligation to present to the War Manpower Commission the seriousness of this problem. This responsibility we will meet squarely and to the best of our ability.

—Photo courtesy Los Angeles Herald & Express

The Gulf Oil Co. was well represented as shown by left to right: Lot Bowen, Charles Dresbach, Tom Wallace, G. W. Ledingham, R. W. Clark and E. W. McAllister.

Although 1943 will probably see less drilling throughout the United States, I am hopeful that there will be more drilling in California. Steps have been taken and will be taken in order to insure the availability of materials for drilling of the wells we need. First, the War Production Board has instituted the Controlled Materials Plan under which the available steel, copper, and aluminum will be directly allocated in kind. Under this new system we will have direct allocation in place of a priority rating—a **certified check** in place of a **hunting license.**

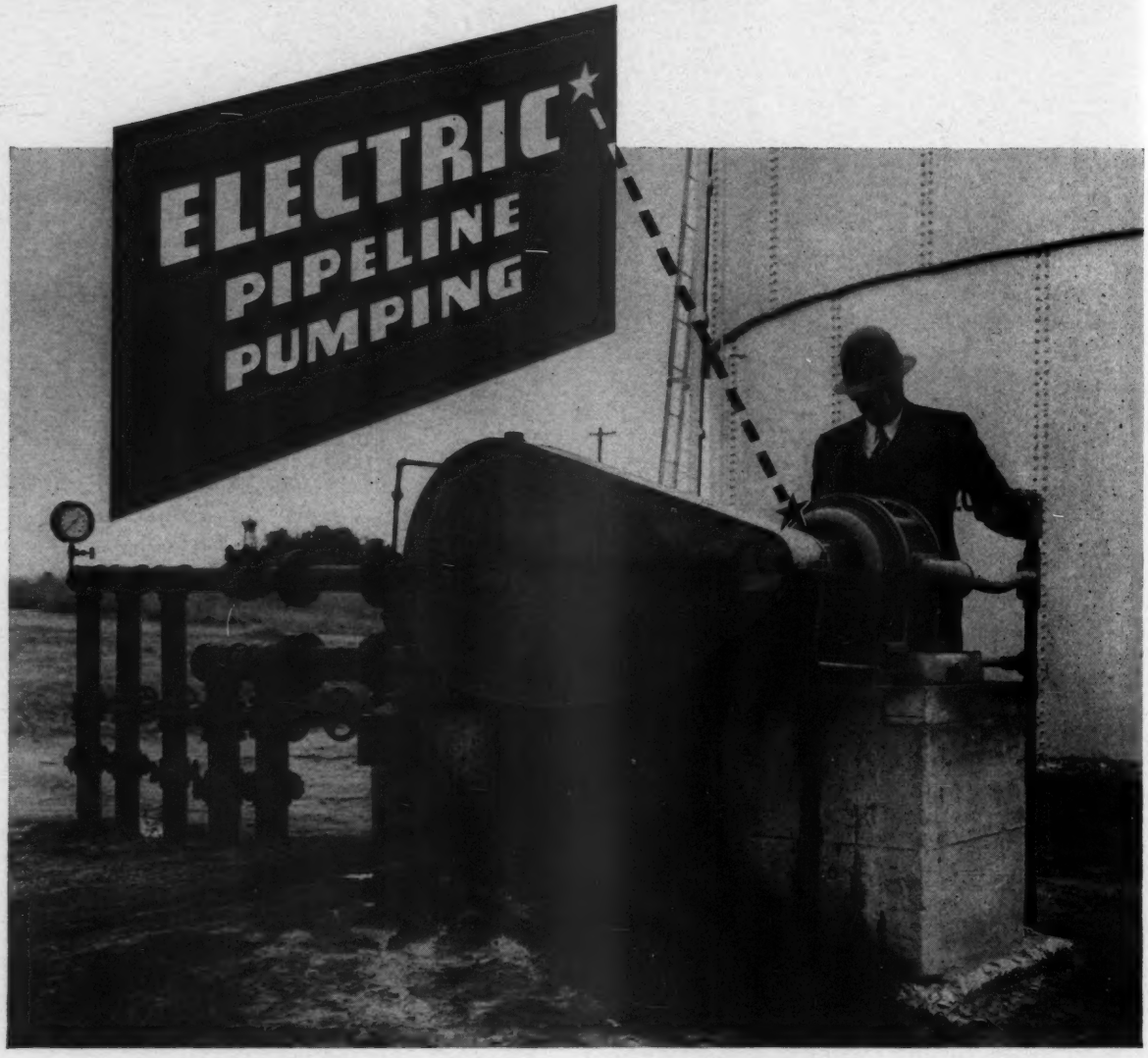
Briefly the plan works something like this: The Army, the Navy, the Lend Lease Administration and others have been designated as "claimant agencies." Each of these claimant agencies will indicate to the War Production Board the quantity of each of the critical materials the agency will require during the coming period, supporting the request by a full explanation and justification for the proposed uses. The Petroleum Administration for War will submit the petroleum industry's needs. Upon receipt of the total estimated material requirements, the War Production Board will then balance the requirements against the supply and make definite allotments of material to each agency. Proportionate allotments will then be made by the claimant agency to the manufacturers to be used in making the necessary equipment. In brief, the Controlled Materials Plan is designated to provide **definite allotments** of **controlled materials** for **specific uses.** With definite allocations we should be able better to plan our entire operations and be able to be more specific in portraying to the industry what it may expect in the way of materials.

The transition during the next few months from the present production requirements plan to the Controlled Materials Plan, no doubt, will be hectic; while it leaves some things to be desired, there is much merit in it.

The second step which will be taken to insure, if possible, that material is available for drilling needed wells, will be the issuance of an order which will prohibit all drilling except upon a "certificate of necessity" from the Petroleum Administration for War. The principal purpose of superimposing this control over the existing M-68 pro-

(Continued on Page 25)

WARTIME PRODUCTION DEMANDS THIS ECONOMY



In these days with man power at a premium, don't waste time and money by firing up a boiler to operate a steam pipeline pump. The flip of an electric switch handles the transfer of oil easier, better, cheaper.

An electric pump needs less attention for faultless operation and maintenance.

An electric motor provides a smooth flow of pumping power—saves wear and tear on equipment.

Get set now to meet the war's oil demands with electric power. You'll stay with electricity after victory. Let us make suggestions to fit your needs.

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Certain Aspects of Cooling Tower Design and Operation

By Raymond C. Kelly
The Fluor Corp., Ltd.

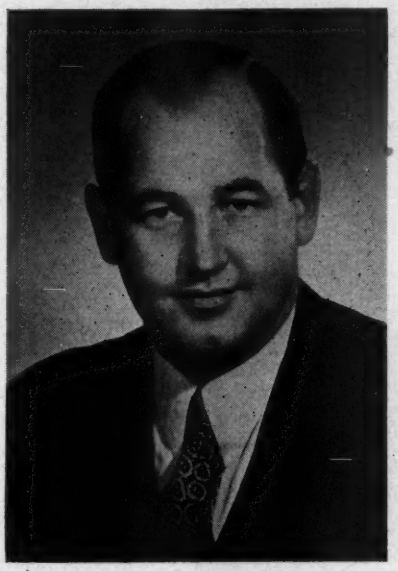
Presented to California Natural Gasoline Association Monthly Meeting, Rio Hondo Golf Club, Downey, California, December 3, 1942

Many papers presented on the subject of cooling towers have presumed that the reader had a working knowledge of the evaporative phenomena and the basic elements of cooling tower design. To not overlook the possibility that today new men are being called into new jobs and that these men may welcome a review from the "bottom up," we will discuss briefly each of the principal methods of evaporative water cooling.

Although industrial water cooling has apparently progressed through definite stages in the use of cooling ponds, spray ponds, spray coolers, atmospheric deck-type towers and mechanical draft type towers, it cannot be conclusively stated that any one method is universally better than the others. Rather, each has its own application and relative advantages and disadvantages. To analyze these relative merits and at the same time develop a background for the discussion of the comparison of atmospheric and mechanical draft towers, certain data for cooling ponds, spray ponds and spray coolers will be discussed briefly.

The principal factors entering the analysis are: The initial temperature (t_1) of the hot water entering the unit; the wet bulb temperature (t_{wb}) of the air entering the unit; the quantity of air (or velocity) passing over the surface of the water; and the final temperature (t_2) of the water leaving the apparatus. With any particular quantity of water to be cooled the size and design of the cooling apparatus is determined by proper consideration of each of the following factors:

(a) Range of temperature through which water must be cooled.
(b) Approach of the cold water temperature to the wet bulb temperature.



Raymond C. Kelly

(c) Mean maximum (or otherwise selected) atmospheric wet bulb temperature at which the required cooling must be done.
(d) Time of contact of air and water, determining the proportions of the structure as to height, length and concentration of water.
(e) Surface area (film surface) of water exposed to particular quantity of air entering the apparatus.
(f) The relative velocity and direction of air movement with respect to water movement.

Cooling Ponds

The cooling pond or reservoir, now used principally for small heat load systems in which the heat exchange surface is designed for low temperature rise of the circulating water, can be quickly estimated by determining the amount of water evaporated under the design conditions. One approximating method of solution, using Box's formula, determines the grains of moisture ("G") evaporated per hour per square foot of horizontal water surface, assuming still air, and assuming an average temperature rather than an integrated value.

$$G=240+3.7\left[\frac{t_1+t_2}{2}\right](P_s-P)$$

in which P_s is the pressure of the saturated vapor in inches of mercury corresponding to the average temperature

$$\left[\frac{t_1+t_2}{2}\right]$$

of the circulating water in degrees Fahrenheit (°F.) and P is equal to the actual vapor pressure of the air in inches of mercury ("Hg.).

From the basic physical equation

$$\frac{\text{Btu / hr.}}{\text{min / hr x lbs / gal x } (t_1-t_2)}=\text{GPM},$$

cooling 100 GPM from 95°F. to 85°F. would dissipate approximately 500,000 Btu in one hour. For this example we assume a wet bulb of 75°F. and a dry bulb temperature of 80°F. This fixes the relative humidity of 80%, for which condition we find from the steam tables that $P_s=1.421$ at

$$\left[\frac{t_1+t_2}{2}\right]=90°\text{F.},$$

and $P=1.032x.80=0.825$ at 80% R.H.

Substituting in Box's formula we then find "G"=[240+(3.7x90)] (1.421 - 0.825)=342 grain moisture evaporated per square foot per hour. Also from steam tables we find that 1041 Btu are required to evaporate 1 lb. of water from and at 90°F. Then, since 7000 grains equals 1 lb.,

$$\frac{342}{7000}=0.049\#\ H_2O;\ 0.049x1041=51$$

Btu per sq. ft. per hr. heat loss from

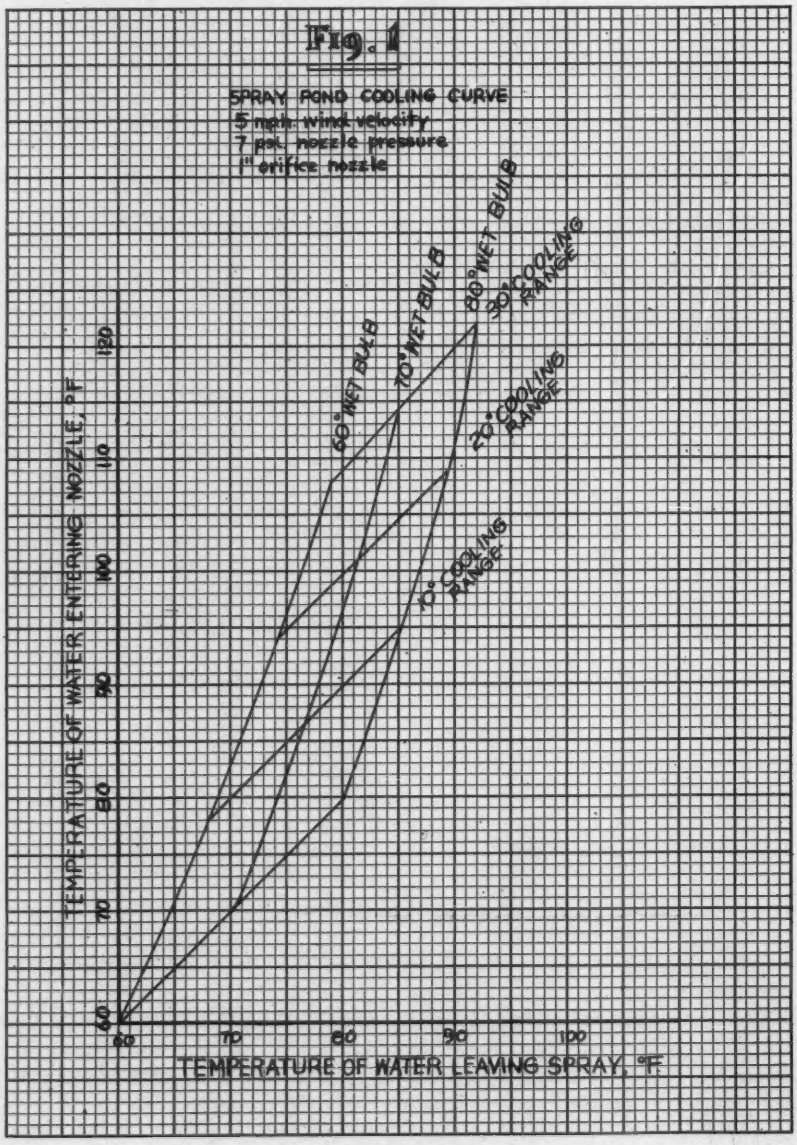
the quiet surface of the pond. This corresponds to $\frac{51}{95-85}$=5.1 Btu/sq. ft./hr./°F. of cooling range. Therefore, to accomplish the desired cooling 100 GPM x 8.33 / gal. x 10° cooling range x 60 min./hr.=500,000 Btu/hr., removal necessary. Then the area of pond required to dissipate 500,000 Btu/hr.

would equal $\frac{500,000}{51}$=9800 sq. ft., which is equal to 0.102 gallon degrees per sq. ft. This determination of required area assumes a zero wind condition. Consequently any appreciable movement of air in addition to that movement induced by differential densities would increase the rate of evaporation and thereby increase the cooling capacity of the pond.

SPRAY PONDS

If this same heat load is to be handled by the same quantity of circulating water, and a system of spray nozzles installed above the surface of the pond—a spray pond with the nozzles discharging vertically upward—the same procedure could be followed to determine the required spray area if the total effective area (film surface) of the drops of water was determinable. This information is unavailable at this time and without it purely theoretical determination is inaccurate. For this reason empirical data—the results of field operating experience—are the sole source of design information.

A so-called "Cooling Curve" for spray ponds is shown in Fig. 1, in which one particular type nozzle at one particular pressure is rated for a 5-mile per hour wind condition. In Fig. 2 various nozzle capacities for several pressures are shown, each one of which requires a typical cooling curve for design analysis.

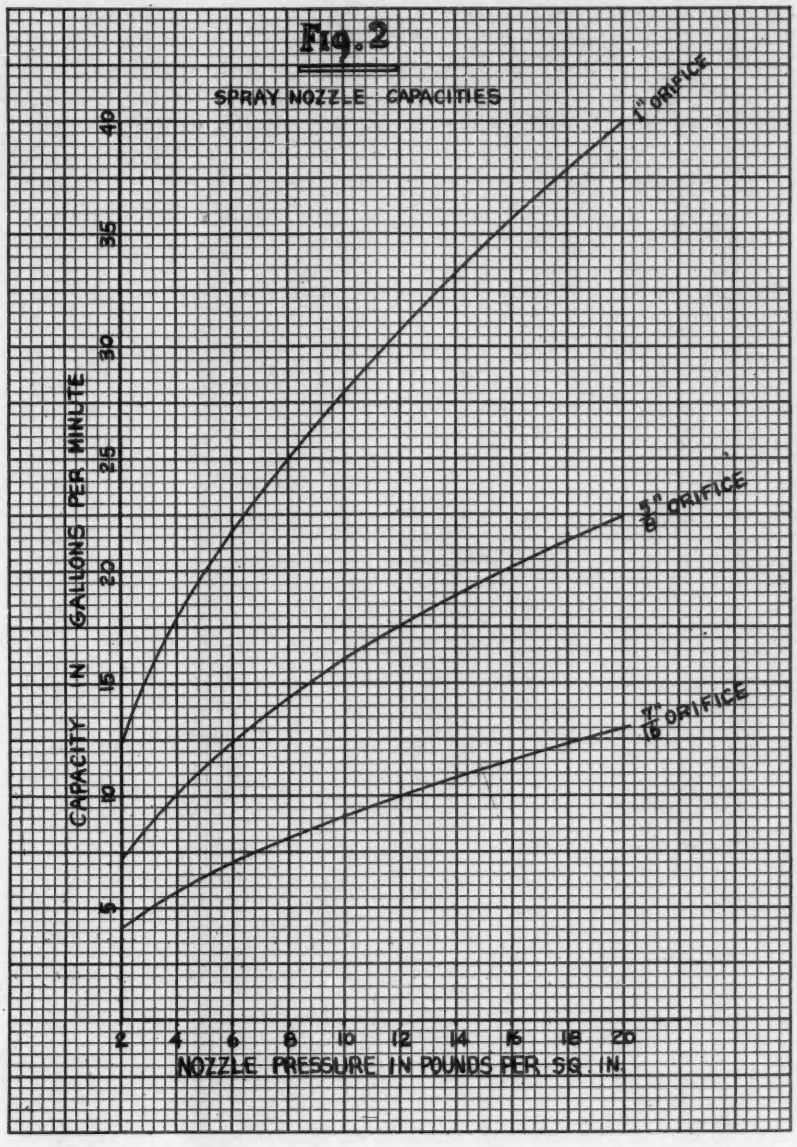


To better show the advantages of spray nozzles over a flat pond, assume a total heat load 10 times as great as the first example, and a cooling range from 95°F. to 85°F. when the wet bulb temperature is 80°F. Circulation of 1000 GPM must dissipate 5,000,000 Btu/hr. From the nozzle capacity chart we find that a typical 1" orifice nozzle at 7#/sq. in. pressure will deliver 23 GPM. Then $\frac{1000}{23}$=44 nozzles will be required. Average spacing of nozzles, in groups or clusters, would require an area of approximately 4,000 sq. ft. This then shows $\frac{5,000,000}{4,000}$=1250 Btu dissipation/sq. ft./hr. of horizontal effective area of the apparatus, or 2.5 gallon degrees per sq. ft. This represents an increase in cooling capacity of from 51 Btu/sq. ft./hr. to 1250 Btu/sq. ft/hr., which increase in space efficiency may be partially offset by increase in costs of the equipment and pumping.

SPRAY COOLERS

Operators of spray ponds found that in periods of just average wind conditions a drift loss of from 5 to 10% of the circulation was common. This was expensive in water cost, and often damaging to adjacent property and equipment. The result was the installation of louver

fences around the pond. Thus the development of the spray cooler — an apparatus which is louvered on all sides, is from 6 ft. to 20 ft. in width and from 12 ft. to 30 ft. in height, in which small orifice nozzles spray directly down at pressures ranging from 5# sq. in. to 20# sq. in. Greater efficiency was found to result if a finer spray of small, but not minute, drops was directed toward the basin rather than if a coarser spray of larger drops was developed by upward spray. This unit, like the spray pond, does not lend itself to simple mathematical analysis because of the difficulty in measuring the amount of film surface exposed to fresh air and the relative velocity of the air passing that surface. Fig. 3 shows a typical COOLING CURVE for a spray cooler operating on 6# sq. in. pressure on downspray nozzles. A typical unit of this type would be rated for 1000 GPM dissipating 5,000,000 Btu/hr. through a 10° cooling range from 95°F. to 85°F. when a 5 mi. wind and a 75° wet bulb prevailed. Here again a typical case is shown to develop the point. This unit would be 12 ft. wide, 1 6ft. high and 60 ft. long, or equivalent to a heat dissipating factor of $\frac{5{,}000{,}000}{12 \times 60} = 6950$ Btu/sq. ft./hr., or 13.9 gallon degrees per sq. ft.



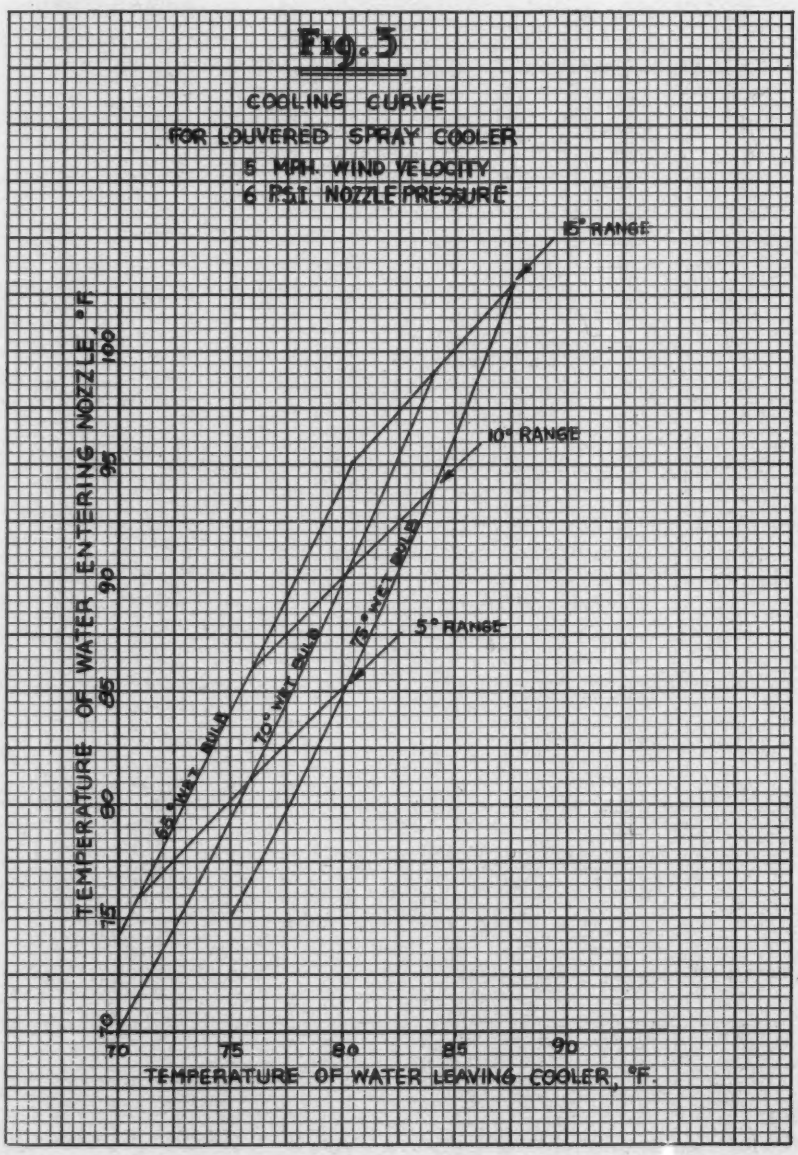
ATMOSPHERIC DECK TOWERS

The next progressive structural step was the standard deck type atmospheric cooling tower. In these units the hot water is distributed over the top of the tower by troughs or pipes with nozzles attached, and as the water falls downward to the basin its fall is interrupted by a series of decks composed of wood battens placed horizontally at intervals so as to break the water into the smallest possible drops and to appreciably increase the period of time of air-water contact. Design data for these units is again largely empirical, based on experience factors, and although deck design and vertical spacing vary somewhat from one make of tower to another, assuming equivalent film surface the thermal efficiency is quite comparable. However, for purposes of this discussion, a standard unit 12′ wide and 35′ high with horizontal decks spaced at 2′ 8″ centers vertically will be the basic unit. This is a tower 12 decks high, in which the water starts at the top and falls downward from deck to deck in 12 "falls" of 2′ 8″ each. Because of the greater temperature differential between the water and the air in the top of the tower, a greater heat transfer per unit of time occurs in the upper portion of the structure. As the water falls and cools the transfer rate decreases and the cooling in the lower portion of the tower is relatively less per unit of time. A graph of this variation in rate of transfer is shown in Fig. 4. An appreciable difference in cooling efficiency is noticeable between the windward side and the lee side of the tower due principally to the saturation of the air as it passes through the tower. This situation is the governing factor in determining the effective width of the structure. A structure too wide would permit the air to become saturated

and therefore do no further evaporative cooling before it had reached the lee side. Most towers are now built in 12′ width and wind velocities as low as 1 mph normal to the long axis of the tower will show efficient cooling across the width of the tower.

The particular advantages of this unit over the cooling pond, the spray pond and the spray cooler are the reduction in space required, the capacity for cooling the circulating water through greater ranges of temperature to within closer approaches to the ambient wet bulb temperature, and the saving in water as a result of adequate louvering on all sides of the structure.

To follow the comparison through, we shall assume a water load of 1000 GPM and a required heat dissipation of 5,000,000 Btu/hr. —a condition which results in a 10° cooling range as in the previous examples. A tower 35 ft. high, 12 ft. wide in effective deck area, and equipped with 12 decks spaced on 2′ 8″ centers, 24 ft. long will cool from 95 to 85°F. when a 75°F. wet bulb exists and a 5 mi./hr. wind prevails at right angles to the long axis of the tower. The effective area in ground space amounts to only 12-x-24=288 sq. ft. This is equivalent to a heat dissipation rate of approximately 17,350 Btu/sq. ft./hr. or 34.7 gallon degrees per sq. ft.



TOWER CAPACITY EXAMPLES

To enable operating engineers and plant operators to check the performance of existing atmospheric towers and to assist design engineers in quickly estimating tower sizes, a set of curves are herewith shown, with a simple method of approximating average requirements.

Assume the following condition: 1500 GPM to be cooled from 90°F. to 75°F., with a 3-mile wind and a 70° wet bulb.

Problem 1.

Problem is to obtain the number of 6′ sections of a 35′ 0″ high, 12′ 0″ wide, 12-deck tower.

From these conldditions:

t_1 (inlet temperature) =90°F.
t_{wb} (wet bulb temperature)—70° F.
t_2 (final temperature =75°F.

The cooling range (t_1-t_2) is therefore 15° and the approach (t_2-t_{wb}) is 5°. C=concentration per sq. ft. of horizontal deck area obtained from Fig. 5. "A" (area of one standard tower section, 12′ 0″ wide, 6′ 0″ long)=72 sq. ft.

N=No. of 12′ 0″ wide, 6′ 0″ long, tower sections.

To determine the number of sections under the above conditions, the following equation is used:

$$\frac{GPM}{C \times A} = N.$$

From Fig. 5.

C for 35′ 0″ high tower, for an approach of 5° and a t_1-t_2 of 15°= 1.17. Then substituting in the above equation:

$$\frac{1500}{1.17 \times 72} = 17.8$$

Problem 2.

If the wet bulb is other than 70° upon which Problem 1 is based, a wet bulb correction factor must be used. This factor is C_{wb}, obtained from the wet bulb curve Fig 6. The problem then becomes one of figuring the number of sections required

with the same tower height.

Conditions to be met:

Assuming 65° wet bulb, 5° approach, 15° range. To determine the number of sections under these conditions, the following equation is used:

$$\frac{GPM}{C \times C_{wb} \times A} = N$$

C for 35′ 0″ high tower, for an approach of 5° and a t_1-t_2 of 15°= 1.17 Fig 5. Correction factor for wet bulb (C_{wb}) is obtained from Fig. 6 and in this problem = 0.85.

Then substituting in the above equation:

$$\frac{1500}{1.17 \times .85 \times .72} = 20.8$$

Therefore, under these conditions a 21-section tower 35′ high is required.

Problem 3.

Assuming that 35′ 0″ high tower does not meet your requirements due to ratio of range to approach, then a tower of greater or lesser height must be figured. Therefore, a height correction factor must be used. This factor, Ch, is obtained from the height curve Fig 7. Required a tower 51′ 0″ high, instead of 35′ 0″, for conditions stated in Problem 1.

To determine the number of sections under the above conditions, the following equation is used.

$$\frac{C \times Ch \times A}{GPM} = N$$

Ch, correction factor for height, is obtained from Fig. 7 and in this problem=1.63.

Then substituting in the above equation:

$$\frac{1500}{1.17 \times 1.63 \times 72} = 10.9$$

Therefore, under these conditions an 11-section tower 51′ high would be required. In this last problem if the wet bulb is other than 70°, the wet bulb correction factor (C_{wb}) becomes a part of the equation:

$$\frac{GPM}{C \times C_{wb} \times Ch \times A} = N$$

The data used for the preparation of the curves is generally conservative and does not necessarily represent the most economical selection for every cooling job in every locality.

TABLE I

Approach to wet bulb temp. desired, °F.	Relative tower length
5	4.5
10	2.5
15	1.5
20	1.0
25	.8
30	.5

Further correction for variation of tower size with approach of the water temperature to the wet bulb temperature and wind velocity may be estimated as follows:

TABLE II

Design wind velocity	Relative tower length
1	1.55
2	1.40
3	1.25
4	1.10
5	1.00
6	.95

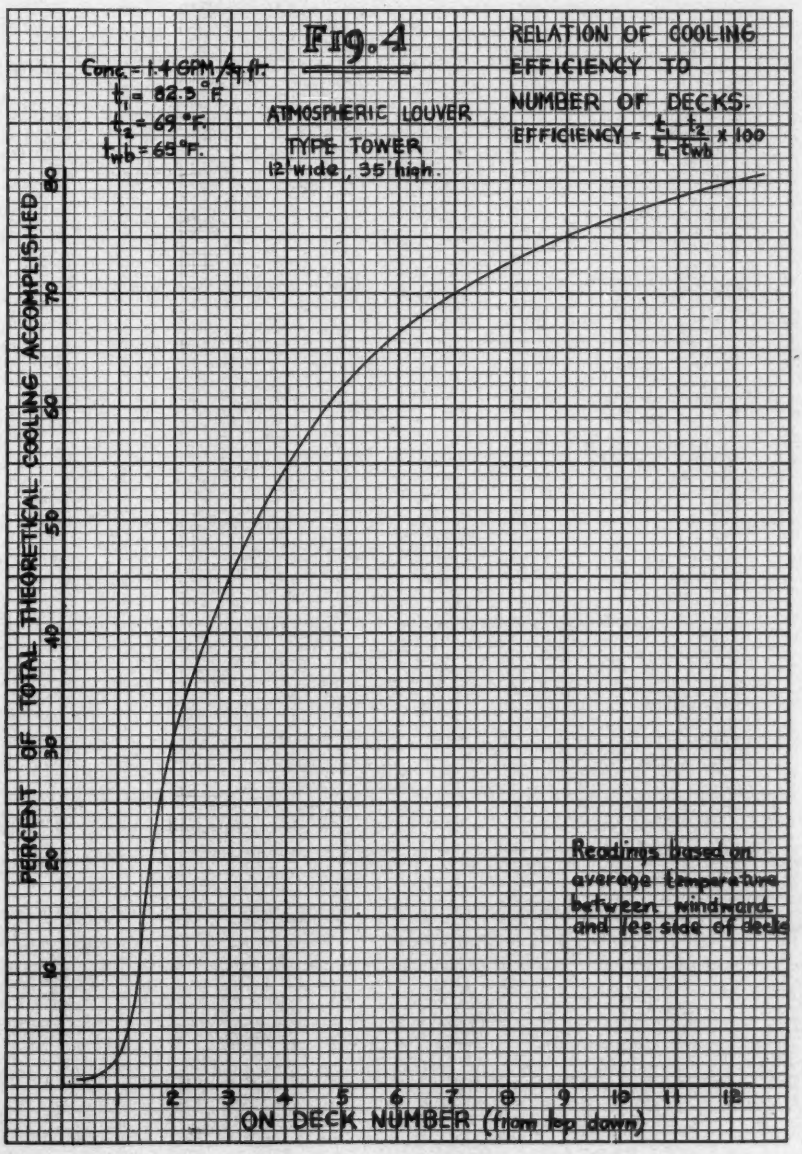


Fig. 4
RELATION OF COOLING EFFICIENCY TO NUMBER OF DECKS.
EFFICIENCY = $\frac{t_1 - t_2}{t_1 - t_{wb}} \times 100$
Conc. = 1.4 GPM/Sq. ft.
t_1 = 82.5° F.
t_2 = 69 °F.
t_{wb} = 65 °F.
ATMOSPHERIC LOUVER TYPE TOWER
12' wide, 35' high.
PERCENT OF TOTAL THEORETICAL COOLING ACCOMPLISHED
10
20
30
40
50
60
70
80
90
1 2 3 4 5 6 7 8 9 10 11 12
DECK NUMBER (from top down)
Readings based on average temperature between windward and lee side of deck

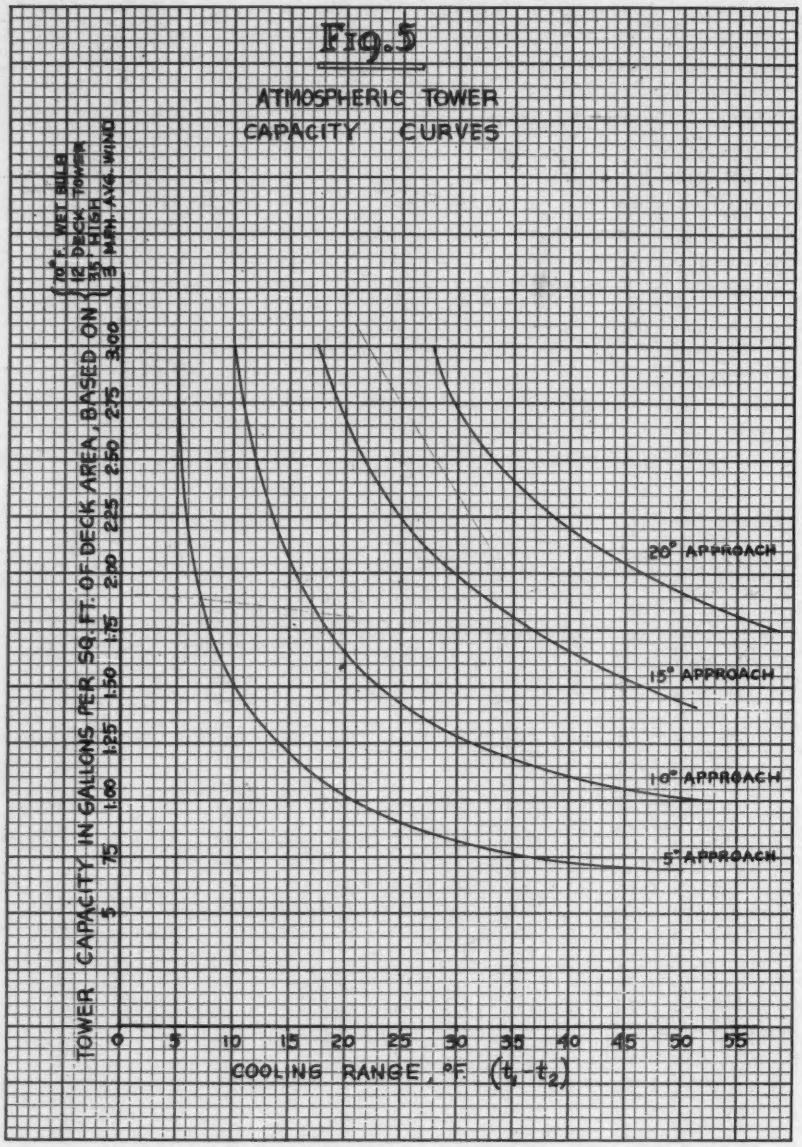


Fig. 5
ATMOSPHERIC TOWER
CAPACITY CURVES
(70° F. WET BULB
1/2 DECK TOWER
35' STR.
13 MPH. AVG. WIND)
TOWER CAPACITY IN GALLONS PER SQ. FT. OF DECK AREA, BASED ON
5 .75 1.00 1.25 1.50 1.75 2.00 2.25 2.50 2.75 3.00
20° APPROACH
15° APPROACH
10° APPROACH
5° APPROACH
0 5 10 15 20 25 30 35 40 45 50 55
COOLING RANGE, °F. $(t_1 - t_2)$

In this brief resume of tower design factors, we have purposely omitted corrections for elevation above sea-level (barometric reading), limited concentrations of water on decks of tower, limiting ratios of cooling range to wet bulb approach and low wet bulb considerations. Adequate discussion of these elements of design will be undertaken at a later date, but from the data above it can be seen that for any given heat load in a system the tower size will increase if low wind velocities govern the design or if high wet bulb conditions govern, and, if a higher tower is selected to minimize ground space requirements and basin costs, the pumping horsepower increases proportionately.

Generally speaking, the greater the cooling range required, or the closer the approach to the wet bulb temperature desired, the higher the tower should be—up to economical structural limits, or to a height such that, without proper control, the water would be blown over to one side of the tower. Tower height up to 60′ is standard design, although 35′ height is average. Likewise, concentrations as low as ¾ GPM per square foot of cross sectional deck area are possible, although 1.5 to 2.5 GPM/sq. ft. is considered a general average for the majority of atmospheric towers in use. In applications of low concentration in which the tower loading is less than 1 GPM/sq. ft., special precaution must be taken to prevent the accumulation of water on the lee side of the structure and to prevent excessive drift loss from the tower. Drift loss, the term applied to the actual suspended water carry-over from the tower can be controlled for any normal wind conditions by providing drift eliminators or baffles at the point of discharge of the vapor from the tower. Such drift eliminators or baffles must be designed into the structure as an integral element of the unit. Most drift eliminators are arranged so that a definite change in direction of flow of the vapor will take place just as the leaving air passes the lee edge of the decks. This change in direction of flow causes the air to turn sharply and the inertia in the particles of water causes the entrained moisture to continue on its path to impingment on the baffles. The actual drift loss from a properly designed atmospheric tower under average wind conditions need not exceed 0.2% of the total water being circulated, approximately equal to the drift loss from an average mechanical draft tower.

MECHANICAL DRAFT TOWERS

The mechanical draft towers, both forced and induced draft types, bring into the cooling tower design study three important elements of control of the air entering the structure——volume, velocity and distribution. By means of fans, blowing fresh air horizontally into the forced draft tower or drawing saturated air vertically out of the induced draft tower, a predetermined quantity of air at a controlled velocity and direction is caused to contact the falling water intimately and with considerable turbulence. The gross result is a tower requiring less ground space and less pumping horsepower—advantages which are

somewhat offset by power consumed by fans and by the inherent mechanical problems of maintaining equipment in saturated vapor at elevated temperatures.

To briefly summarize the design data for mechanical draft towers three sets of data are prepared in graph form for easy reading. In Fig. 8 is shown the nominal area required per gallon of circulating water for an average tower 20 to 26 ft. high in which closely spaced decks fill approximately 12 to 15 ft. vertical dimension. Decks are designed to break the fall of water and hold a portion of the water in contact with the air for as long a period of time as economically desirable.

Carrying forward the earlier comparison of ground space required we shall assume a heat load of 50,000,000 Btu/hr., 10 times as great as could be handled by the 4000 sq. ft. spray pond, and shall dissipate the total quantity of heat by the circulation of 5000 GPM taking a 20° cooling range and a 10 degree approach to a 70° wet bulb temperature. In this situation

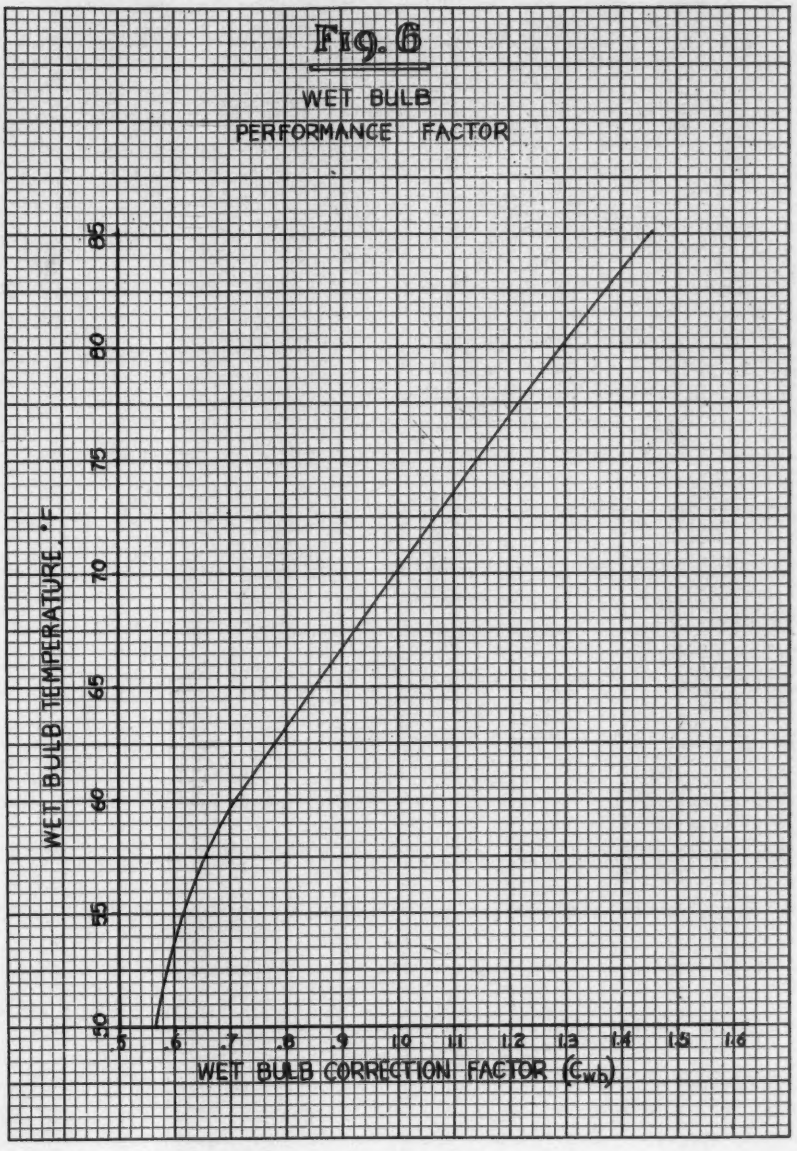
$t_1 = 100°F.$
$t_2 = 80°F.$
$t_{wb} = 70°F.$

From Fig. 8, which shows approximate values for one particular type tower filling, we see that .44 sq. ft. of tower area is required per gallon per minute of water circulated, so the total theoretical area at 70° wet bulb (unity) is 5000 x .44 =2200 sq. ft. This represents a capacity of 22727 Btu/hr./sq. ft. or 45.6 gallon degrees/sq. ft.

The effect of wet bulb temperature with respect to the area required is theoretically approximated in Table III. A calculated area, based on the values in Fig. 8 for a 70° wet bulb condition must be corrected by the factor value shown.

TABLE III

t_{wb}	Factor	t_{wb}	Factor
50	1.66	70	1.00
55	1.45	75	.886
60	1.28	80	.785
65	1.13	85	.697



From this table it can be seen that the theoretical area required in our example need not be corrected for wet bulb temeprature and therefore a tower of 2200 sq. ft. horizontal ground area will be selected. Because economical production of standard towers dictates a minimum number of sizes, the usual selection is made in increments of 4, 6 or 8′ in length and width. Our case therefore falls into a standard four-cell tower in which 18x30′ cells of 540 sq. ft. each will total 2160 sq. ft. Within reasonable limits the shortage of actual area can be compensated for by an increase in air velocity through the tower, which in turn necessitates an increase in horsepower input to the fan. An increase in velocity increases the resistance to flow of air through the tower and enters the computation as an increase in "static pressure" as shown in approximately 1.85 per cent. From the curve a static pressure of .3100 is used to calculate the speed and horsepower. These calculations must be based on the particular fan being used and are a function of inherent resistance to air flow in any particular tower and the velocity required in that tower. Today air velocities in standard

counter-current flow towers range from 250 feet per minute up to 400 feet per minute, depending upon the amount of "filling" or deck surface in the unit, and upon the concentration of water in GPM per sq. ft. of horizontal area of the structure. If a tower is built to accommodate a certain quantity of water on the basis of 300 ft. per minute air velocity through the filling, an increase in water concentration will offer greater resistance to the air flow, and therefore, in order to maintain the proper air-water volumetric-ratio, the fans must turn faster or the pitch of the blades be increased. If standard synchronous speed electric gearmotor drives are used the speed is fixed and pitch increase, with resultant increase in input horsepower, is the simplest means of maintaining the necessary flow of air through the tower.

If a tower is basically designed for maximum efficiency at a concentration of 2 GPM/sq. ft. and counter-current air flow of 300 ft. per minute, the correction for concentration from the 2 GPM-300 fpm base is shown in Fig 10. The fan input horsepower calculated from the 2 GPM—300 fpm base must be corrected by the amount shown for C_{hp} on the curve. In the example, the concentration is equal to

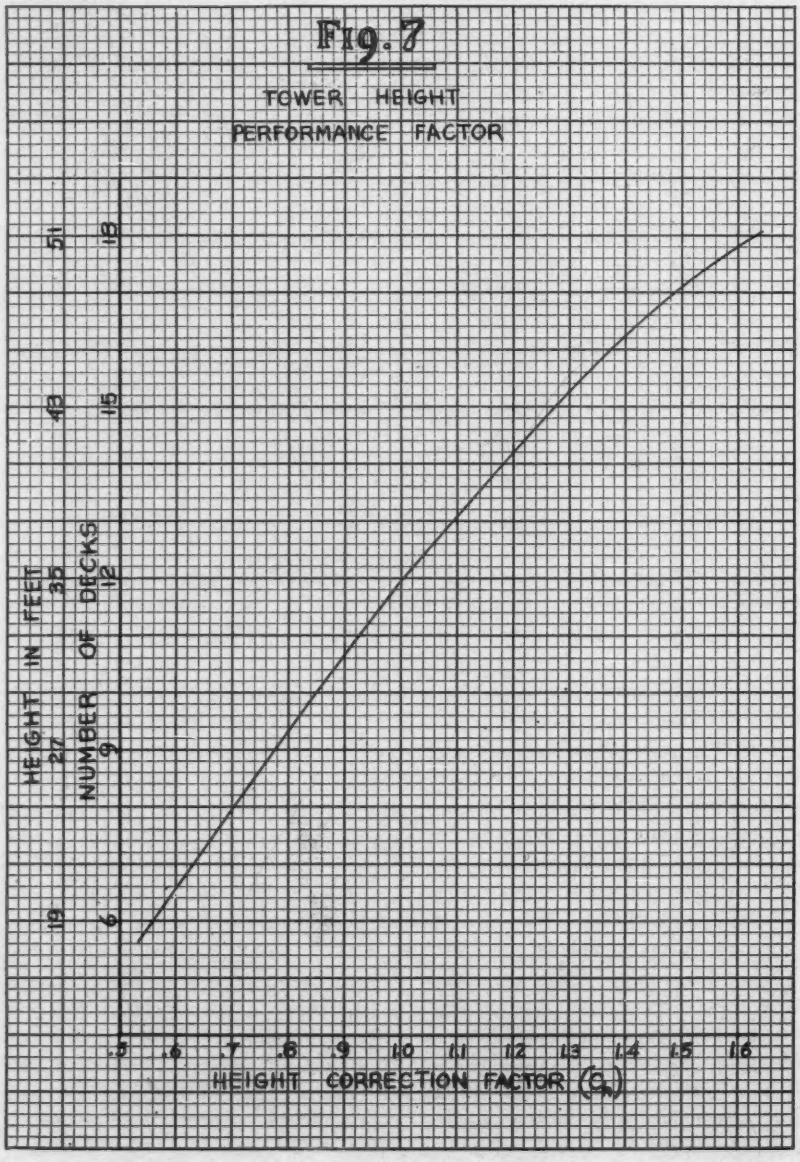
$$\frac{5000}{2160}=2.32 \text{ GPM/sq. ft.},$$

for which value the base horsepower must be multiplied by 1.012.

This concentration correction suggests a particular problem in mechanical draft cooling tower design. If the heat exchanger specification indicates that a 20° temperature rise is desired, the cooling tower is often designed for a 20° cooling range with a certain water rate. Fans, motors and gears and the distributing system within the tower are selected for this particular condition and the equipment is installed. After some operating experience the plant engineer may find that a more economical overall plant operation could be achieved with greater water circulation and lesser cooling range for a lesser temperature rise in the exchangers. This means greater load on the distributing system, an increase in fan horsepower and a change in the air-water ratio of the tower. To allow for such contingencies it is well for the purchaser of mechanical towers to specify the limits within which the equipment may be expected to dissipate a certain quantity of heat so the manufacturer of the tower can provide in the distributing system, in the range of pitch settings of the fan blades and in the horsepower of the motors for such variations. The use of multispeed motors, steam turbines or gas engine drives, all with variable speeds available, is a partial answer to the problem. The atmospheric tower is, of course, less critical in this respect. Increases in water rate up to 100% have been tested and found to decrease the overall efficiency of the atmosphere tower as little as 7%.

Without regard for the immediate aspect of critical materials such as steel, iron, copper, etc., and available power and man hours of labor and machine time, a few comments, pertinent to a comparison, are made with reference to an average cooling tower installation.

Fig. 7

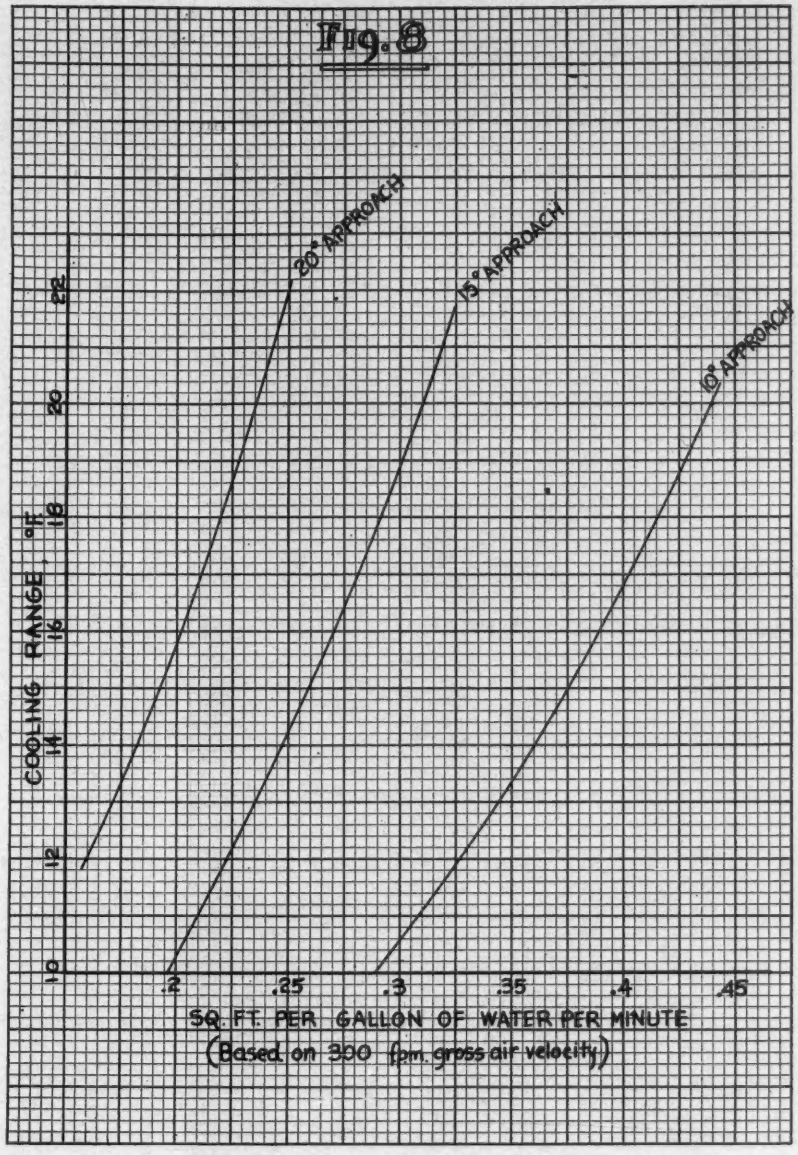


In the average industrial plant cooling circuit the basic requirement is heat dissipation, without critical regard for temperature. In some plants constant temperature water is essential . Temperature fluctuations will occur in both types of towers with fluctuations in wet bulb temperature. In mechanical draft towers the change in off-tower water temperatures can be held to a minimum by adjusting the pitch of the fan blades or reducing the speed of the fans or by by-passing some of the hot water directly into the basin by means of thermostatically controlled, mechanically actuated valves. In atmospheric towers, with the wind velocity also affecting the water temperature, by-pass lines to secondary distributing systems or directly to the basin can be installed to effect the same degree of temperature control as attainable with the mechanical draft towers.

Although wind definitely affects mechanical tower performance, the effect is seldom more than 10% decrease in capacity due solely to reduced air flow through the tower. However, another element of design enters the picture when the wind causes the hot, saturated vapors discharging from the tower to recirculate back into the air intake of the tower. This means the "entering air" is at a higher wet bulb temperature and higher degree of saturation. The water temperature rises in approximate proportion to the increase in wet bulb.

One large user of both induced and forced draft towers determined by actual field test that it was true operating economy to build the discharge stacks of their towers up to a point 50′ above the ground, or 25 feet above the top of a 25 foot high tower. By thus discharging the hot saturated vapors the moisture and heat was so diffused into surrounding fresh air that the effect of recycling was negligible.

It is extremely difficult to anticipate the net results of recycling. Some engineers prefer to specify "spare cells" in addition to the actual required number. Others merely



select a higher design wet bulb condition. But neither of these methods fully protects the purchaser. Full discussion of the value of each degree increment of cooling usually leads to a satisfactory compromise between adequate tower and cost of installation and operation.

Response to the common question, "Which type tower is best?", is a matter of opinion, in one view, and application in other. The true analysis rests on the facts of each individual situation. If open space near the plant site is available, for normal thermal ranges an atmospheric tower will do the same cooling job for less initial cost and less operating and maintenance cost than a mechanical draft tower. If power costs are exceptionally low and a maintenance crew is available, the mechanical draft tower might be the economical selection. If unusually high (80° or more) wet bulb conditions prevail for relatively long periods of time with no appreciable wind, the mechanical tower has certain distinct advantages.

Considering only initial cost, if towers of like quality in workmanship and materials are compared for a plant which has available open space, the atmospheric tower usually will be lower in first cost for average wind velocities above 2.5 miles

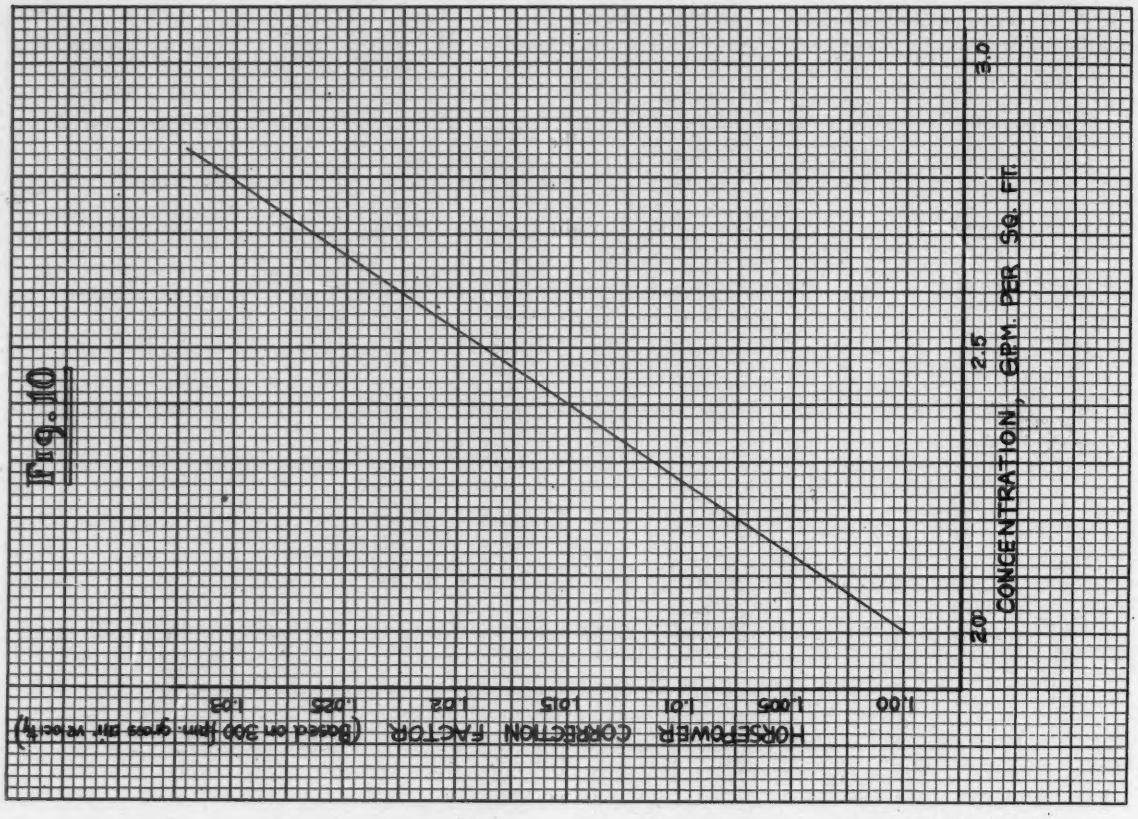


Fig. 10
CONCENTRATION, GPM. PER SQ. FT.
2.0
2.5
3.0
HORSEPOWER CORRECTION FACTOR (Based on 300 fpm. gross air velocity)
1.00
1.005
1.01
1.015
1.02
1.025
1.03

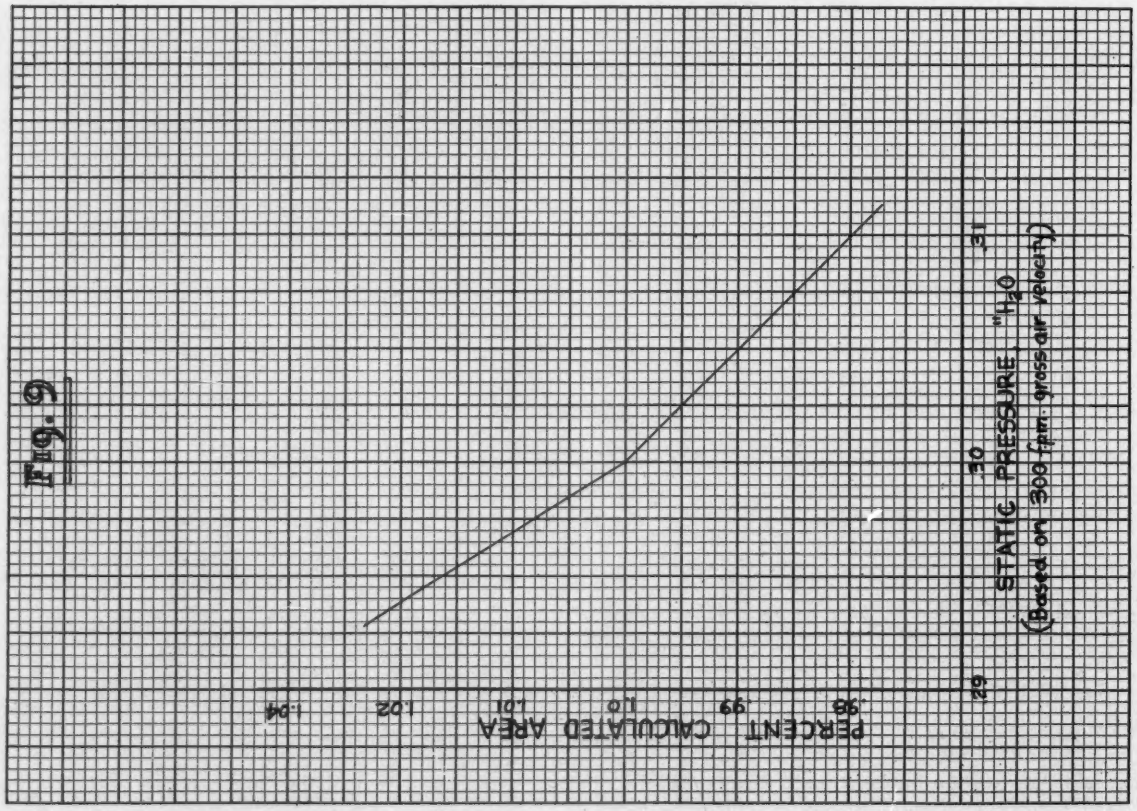


Fig. 9
STATIC PRESSURE, "H2O
(Based on 300 fpm. gross air velocity)
29
30
31
PERCENT CALCULATED AREA
98
99
1.0
1.01
1.02
1.04

Certain Aspects of Cooling Tower Design and Operation

(Continued from Page 21)

per hour. Below this average, for comparable cooling, the mechanical tower will represent a lesser investment.

In operating cost, if both fan horepower and pump horsepower are evaluated, the atmospheric-type unit will show a saving in almost all cases. In locations in which the operating limits of the atmospheric unit are approached—in high wet bulb areas where high relative humidities prevail during periods of unusually low wind velocity—the mechanical draft towers show a distinct advantage to the operator.

As mechanical draft tower designs improve, as efficiencies are increased and power costs are decreased, the economical applications of mechanical towers will increase in number. Improvement in fan design and materials of construction of the mechanical parts of the "power towers" will go far in widening the scope of their applications. The industry at large is spending increasing amounts of money on research toward a more efficient simple mechanism so that it may offer to the industrial users a more efficient, more economical cooling unit.

National Supply Division Receives Maritime "M"

The National Supply Company's Superior Engine division at Springfield, Ohio, was officially awarded the United States Maritime Commission "M"" December 17th, at ceremonies at the Springfield plant.

Presenting the Maritime "M" pennant, Victory Fleet Flag, and Maritime Merit Badges was Admiral H. L. Vickery, vice chairman of the U. S. Maritime Commission. Among the speakers at the ceremonies were Governor John W. Bricker, of Ohio, and A. E. Walker, president of the National Supply Company.

Engineering, Technology, latest news—twice a month in California Oil World.

Gas Co. Starts Construction on Butadiene Plant

In order that synthetic rubber production may be started on the Pacific Coast at the earliest possible date, a sizable construction program now is under way at one of the Southern California Gas Company's manufactured gas plants.

Under this program, the gas company is having an Extraction Plant built by C. F. Braun & Company for the purpose of taking high pressure gas from the outlet of the company's compressor plant and extracting crude butadiene from the gas. The gas company itself is building additions to its existing boiler plant and gas generating facilities under an agreement with the Defense Plant Corporation.

Since a very considerable amount of existing gas plant equipment required in the butadiene process—such as gas generators, boilers, compressors, and gas holders—is available at the Southern California Gas Company's works, a considerable saving in expenditures for large amounts of critical materials has been effected.

An operating agreement has been made by the Rubber Reserve Company and the gas company, whereby the Rubber Reserve will supply gasoline feed stock, which will be used for producing gas containing butadiene. Rubber Reserve will pay its standard fee per ton of butadiene produced, which fee also covers the management expense of plant operations, as well as any charges which might be assigned for the use of the gas company's equipment, which has a value of approximately $6,750,000.

The estimated production of butadiene by the gas company is 30,000 tons a year. Crude butadiene will be piped from the gas plant to Shell Chemical Company near Torrance for purification, and then delivered to a co-polymer plant, where it will be polymerized with styrene to produce synthetic rubber.

Initial steps looking toward the development of this project were taken in April of this year when technical engineers representing Rubber Reserve Company made a nation-wide survey of existing plants potentially suitable for the production of butadiene. Several of the most adaptable plants for early production under tested methods were found in the manufactured gas industry. A study was made of the larger oil-gas manufacturing plants on the Pacific Coast, with the result that Rubber Reserve instructed Southern California Gas Company to proceed with necessary plant additions and modifications for the early production of butadiene.

Kenneth Allen Johnston

Kenneth Allen Johnston, geologist and geophysicist, passed away at Los Angeles, California, on November 13, 1942, following a serious abdominal operation at the California Hospital. He was born at Boulder, Colorado, on March 18, 1904, and received his A.B. in geology, cum laude, from the University of Colorado in June, 1925. Following his graduation he was geologist and geophysicist for such companies as the Midwest Refining Company (Stanolind), The Texas Company, the Geo. F. Getty Company, and for the past seven years has been connected with the Buttes Oilfields, Ltd., Oakland, California, discovering for that company the first commercial gas field in northern California at the Marysville Buttes, Marysville, California. He is survived by his wife, the former Esther Alice Smith of Boulder, Colorado; and his mother, Mrs. Daisy Allen Johnston of Phoenix, Arizona. Mr. Johnston had been in ill health for a number of years but his superior courage and gentleness of heart in the face of this obstacle won for him the admiration and respect of all who knew him. He was a prolific reader and his intelligence and visionary outlook on world affairs together with his brilliance of wit endeared him to his friends and close associates. He had been an active member of The American Association of Petroleum Geologists since 1928.

Now AMERICA CASHES IN ON THE PETROLEUM INDUSTRY'S RESEARCH BACKLOG

TIRELESSLY and unobtrusively, brilliant engineers and scientists employed by America's oil producers have for years carried on exhaustive industry research. Their investigations and perfected developments have meant much to the happiness not only of Americans, but of all peoples of the world.

Those working for this gigantic competitive oil industry research foundation have always made new processes and products available in an orderly manner. Pearl Harbor changed that procedure. Innumerable products and developments intended for use on America's peace front were immediately placed "en masse" at the command of our fighting forces. Thus America's war front gained their immediate advantages.

At sea, on land and in the air, the forces of the United Nations are cashing in on a tremendous backlog of experimentation and scientific study. Literally five years of work has been accomplished "overnight" since Pearl Harbor.

From Petroleum's vast and varied production comes materiel for the destruction of America's enemies. Longer-lasting lubricants, "block-busting explosives," high octane aviation fuels, petrochemical rubber, and an endless variety of petroleum base synthetics are included in the industry's contribution to the war effort.

As designers, engineers and constructors to the oil, gas and allied industries, The Fluor Corporation is proud to play its part in the tremendous progress of a great industry.

Fluor is helping the Petroleum Industry's program by designing and constructing synthetic rubber, toluene, aviation gasoline, alkylation, isomerization, recycling, natural gasoline and gas transmission plants and petroleum refineries.

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(Continued from Page 11)

gram is to prevent the consumption of existing warehouse stocks in the drilling of wells in areas where the present productive capacity is adequate, and will be adequate for some time to come, and where transportation facilities are lacking. This will save such steel for uses in areas, such as California, where additional capacity is sorely needed. That does not mean that we can afford to drill any unnecessary wells, but a carefully planned development program should be made for every field where more drilling can be justified.

I want to take this opportunity to urge extra precaution on all operators in the care, maintenance, and repair of all equipment, for this will add materially to its working life. Idle equipment should be put to use. If you don't use it yourself, make it available to other operators. If possible the use of substitutes for critical materials should be investigated. For instance our imports of Manila hemp have been entirely cut off. I know that many of you are now already using substitutes but even further substitutions in this case appear necessary. All of these things appear small, but their widespread adoption will add considerably to the working supplies of the oil industry.

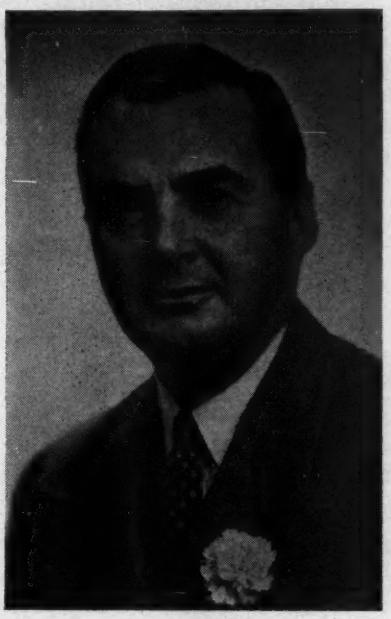
I am glad to note that progress is being made toward the unitization or cooperative operation of several projects here in California so that the best known operating practices can be used. I want to urge that this be done wherever possible. I would like to see some experiments carried on in some of these California fields with thick sand bodies and low gravity oil to see what can be done with gas or water injection. I recognize that there is no abundance of gas in California; however, the results from gas injection in some of the fields in California may justify the use in spite of the scarcity.

There are many frontiers to be explored in California.

The oil industry, I repeat, has a tough job ahead of it. You Californians have the toughest part of a tough job.

George J. O'Brien on Board of California Bank

George J. O'Brien, assistant to the president and ranking Los Angeles executive of the Standard Oil Company of California, has been elected a member of the board of directors of California Bank, according to an announcement made



George J. O'Brien

by Arch W. Anderson, President of the Bank, following the December meeting of the board.

A native of San Diego and a graduate of the University of California, O'Brien has been with the Standard Oil Company of California since 1916, when he went to work as a sailor on one of the company's oil tankers. After serving as an ensign in the United States Navy in World War one, he resumed his career with the Oil Company in San Francisco and Los Angeles where he is widely known.

Just a year ago O'Brien was appointed assistant to the President of the company as well as Los Angeles representative of the board of directors and chairman of the company's committee of executives here. Prior to this appointment he had been treasurer with headquarters in San Francisco.

Active in civic affairs, O'Brien is a director of the All-Year Club of Southern California and of the Los Angeles Area War Chest, as well as a member of the budget committee of the latter organization. He is a member of the California Club, Annandale Golf Club, Newport Harbor Yacht Club, and Los Rancheros Visitadores.

O'Brien is a son of G. N. O'Brien, former president of the American National Bank of San Francisco.

Dockweiler on Board of T.W.A.

Thomas A. J. Dockweiler has been elected to the Board of Directors of Tide Water Associated Oil Company, succeeding the late George N. Armsby. Mr. Dockweiler is a resident of Los Angeles and prominent in law and business circles on the Pacific Coast, is counsel for several oil companies and otherwise interested in the oil industry.

Standard Oil Names Edgar Waite as Chief of Public Relations

H. D. Collier, president of the Standard Oil Company of California, today announced the appointment of Edgar A. Waite to head up the company's public relations work.

Waite for the past five and a half years has been vice-president of Braun & Company, a leading western public relations firm, with head office in Los Angeles. Prior to that he was with the Lord & Thomas and the Benton & Bowles advertising agencies, and before that was a newspaperman.

As a writer, Waite worked for several years in Los Angeles, San Francisco and New York. He also at one time was part owner of a newspaper in Santa Rosa, California.

Waite's offices with Standard Oil will be in San Francisco and Los Angeles. His appointment creates a new position, and does not affect others now with the company.

A. R. Abelt Elected Vice Pres. Chain Belt Co.

At a recent meeting of the board of directors of Chain Belt Company, A. R. Abelt, secretary of the company, was elected a director to replace Mr. F. J. Weschler of the Baldwin-Duckworth division who died last month. In addition to being a director of the company, Mr. Abelt was also elected a vice-president.

A. R. Abelt

A. R. Abelt joined the Chain Belt organization in 1907 as a very young man and literally grew up with the company. He has served it in many capacities which have included production, sales and executive work. In 1922 Mr. Abelt was made sales manager of the Chain Belt and Transmission division, a position he retained until early in 1942 when he became manager of that division. He has been secretary of the company since 1930.

Mr. G. D. Gilbert, sales manager of the Baldwin-Duckworth division of the company, which is located at Springfield, Mass., has been made general manager of the company to succeed Mr. Abelt. Mr. Gilbert entered the employ of the Duckworth Chain and Manufacturing Company in 1918. He was made sales manager of that company in 1924 and was successively sales manager of the Baldwin-Duckworth Chain Corporation and the Baldwin-Duckworth division of Chain Belt Company created by a merger of Baldwin-Duckworth and Chain Belt in 1939. He is also a director of Chain Belt Company.

Norman J. McPhail on Staff of Petroleum Administration for War

Announcement has just been made by C. B. Garretson, Director of Marketing for District Five of the Petroleum Administration for War, of the appointment of Norman J. McPhail to serve as Senior Marketing Analyst on the District staff. District Five includes California, Oregon, Washington, Nevada, Arizona, Hawaii and Alaska with the headquarters in Los Angeles.

Mr. McPhail is well known in the oil industry. Sixteen years of major company experience in sales and executive capacities and twelve years as an independent oil broker has fitted him to give satisfaction in his new work. He expects to return to his brokerage activities after the duration.

Blaine Cole Killed in Action

This week at the Axelson Manufacturing Company in Los Angeles, a blue star was replaced in the company's big service flag by a gold star honoring Lieutenant Blaine Cole.

Lieutenant Cole, former engineer for Axelson, and well known in both the Mid-Continent and California, was the first man from Los Angeles to give his life for his country in the Allied invasion of North Africa.

As an officer engineer in the amphibious forces, he was reported to have been killed in the landing at Casablanca.

Cole was well known to men of the Oil Industry. He was with the Gulf Oil Corporation in Houston for several years before he joined Axelson. Blaine was born in Kansas City, graduated from the University of Missouri and devoted the better share of his engineering life to the construction, drilling and production problems of the Petroleum Industry.

Among the visitors at a recent meeting of the Los Angeles Chapter of Nomads were: Top: Clinton H. Petrie, Burmah Oil Co.; Center: left to right, Clarence Ochs, Ecuador Oilfields, Ltd.; and R. N. Scott, Burmah Oil Co. Bottom: Dr. Affonson Cesario, Engineer, Drilling and Exploration Co.

Buy War Bonds

McElroy Now G. P. Manager of Refining

W. M. McElroy, for more than 25 years associated with General Petroleum Corporation, has just been appointed manager of the refining department of this major oil company. He has been advanced to this executive post after well-rounded experience, during which he has served the Mobilgas producers in various capacities.

Mr. McElroy, a native of San Jose, California, was educated at Santa Clara University, and started with General Petroleum at Taft in May, 1917.

Three years later he was sent to Mexico to represent the company, and subsequently covered territory from Tampico to Seattle. For two years he also served in the refinery at Tampico, first as material clerk, then as assistant superintendent of construction.

Returning to California, Mr. McElroy spent a short time at the Vernon refinery as a pipe fitter, and

W. M. McElroy

in 1922 was sent to Seattle as a fitter foreman. Subsequently he served in Vernon as an estimator and then became foreman of the construction department.

Since early 1923 Mr. McElroy has held positions as constructor, field constructor, assistant engineer, fire prevention and control engineer, assistant refinery superintendent, and more recently, assistant manager of Vernon and Torrance refineries.

Refinery Department Manager McElroy also holds the distinction of having served his country in World War I, as a Second Lieutenant in the 318th Field Artillery.

Havenstrite To Test New Zone

R. E. Havenstrite, Operator, is preparing to try a new zone underlying the Del Valle field of Los Angeles county. Bottomed at 9875 ft., on sec. 16, 4n-17w in the field area. the company's Barnes No. 1 discovered several new potential horizons below the normal Del Valle and Sherman zones with the last sand cored from 9700 to 9860 ft. Presently cleaned out to bottom below the shoe of 7 in. cemented at 9700 ft. the project is running tester for a production trial.

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Detroit	Newark	New York
Philadelphia	Pittsburgh	Milwaukee
Minneapolis	Cotton Duck Mills at Alberton, Md.	

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but
use them sparingly

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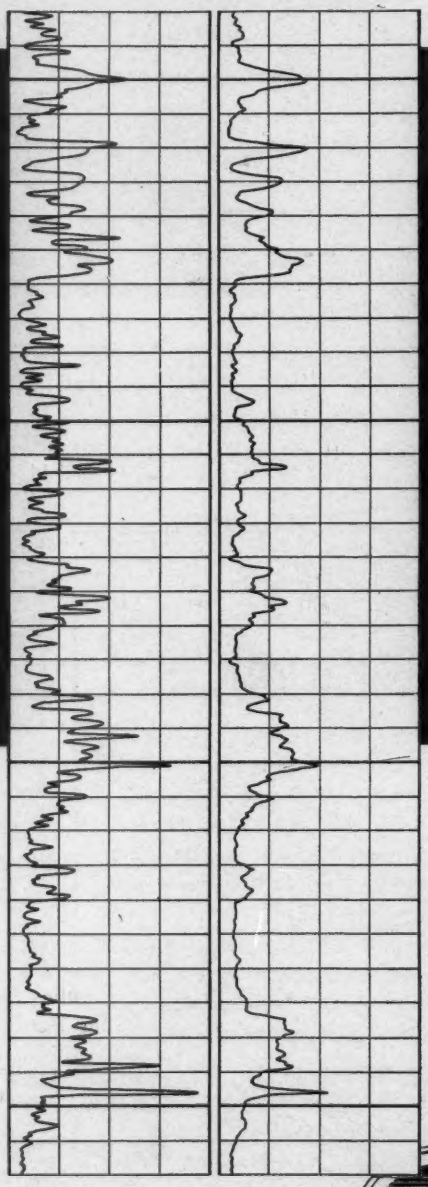
LANE-WELLS *Electrolog* DETAIL CURVE MEETS THE GROWING DEMAND FOR ACCURATE REPRESENTATION OF PRODUCING HORIZONS • • •



THE "DETAIL" CURVE

The "DETAIL" Curve measures the resistance of the formation within a small sphere surrounding a single electrode. Being the most confined measurement it provides the maximum possible detail or response to thin formations. In conjunction with Electrolog's accurate measuring device, this curve indicates the precise depth of all formations from six inches up in thickness. This high degree of response makes possible the correlation of small changes in long shale sections where such correlation would otherwise be impossible.

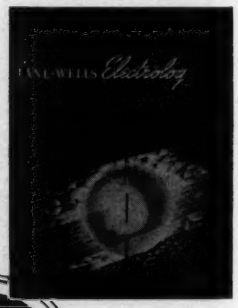
THE "AVERAGING" CURVE

The "AVERAGING" Curve, of the single electrode potential type, is designed to reduce the complication of response of complex formations for easier correlation. This curve may be suited to the particular area to indicate just the right amount of detail on the log. Normal penetration is from 1½ to 3 feet, providing response to beds of two feet and over in thickness, eliminating thinner formations. By this means thicker formations are made to stand out against flat shale base lines, and correlation of complex sections is simplified.

Today's demands for efficient production require exacting knowledge as to the amount of sand in producing horizons. The Lane-Wells Electrolog "DETAIL" Shallow Penetration Resistivity Curve is designed to indicate thin sands and shales with the greatest fidelity. It provides the maximum detail and the sharpest indications of formation variations. This high degree of response makes possible the accurate determination of sand and shale percentages in producing zones as well as correlation in monotonous sections. For particular areas where excessive detail complicates correlation the "AVERAGING" Shallow Penetration Resistivity Curve is available.

For complete information about Electrolog advantages, call your Lane-Wells Field Engineer.

YOU SHOULD HAVE THIS BULLETIN!



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OFF!!

ODT Regulations

Ice Man: Mrs. Brown, since my route has been changed I suppose I have to make you an hour later from now on.

"I ain't going to do it for a nickel
any more,
It makes my back tired
It makes me sore.
Fifteen cents is going to be my
price
For a quarter I'd do it twice.
Want a shoe shine, mister?"

Hubby: "Doesn't my new love technique arouse something in you?"

Wifey: "Yes, it arouses my suspicions."

Teacher: "Bobby, can you tell me where Moscow is?"

Bobby: "No'm, I don't know where it is."

Teacher: "Oh, try anyway. Think hard for a minute."

Bobby: "Well, it's probably out by the barn with Pa's cow."

Mister: "Have you noticed whether any of our people are using the church for private devotions?"

New Janitor: "Yes sir, I ketched two of 'em in there last week, but I soon had 'em out."

"Do you love me, darling?"

"You know I do, Harry."

"Harry? My name's Sam."

"Of course! I keep thinking today is Monday."

"Did you give the prisoner the third degree?"

"Yes. We browbeat him, badgered him, and asked him every question we could think of. He merely dozed off, and said, "Yes, dear, you are perfectly right."

"Oh, John, do you realize it's almost a year since our honeymoon, and that glorious day we spent on the sands? I wonder how we'll spend this one?"

"On the rocks."

Coed: "We girls must be getting home—we're out after hours."

Freshman: "We're out after ours, too."

Papa Stork: "Well, I guess I'll go out and deliver a few baby boys."

Mama Stork: "Believe I'll go and deliver a few little girls."

Baby Stork: "Well, I guess I'll go out and scare hell out of some of these high school kids."

Father meets daughter just home from college.

"My, but you're looking well, dear!"

"Thanks, dad. I weigh 120 pounds stripped for gym."

"Who is Jim?" shouted the astonished father.

The old maid was addressing the soldier boys. She said: "Boys, whatever you do, don't get married —take it from me."

Magician (sawing woman in half): Now, ladies and gentlemen, after the young lady is severed, her brains will be given to a medical college and the rest will be thrown to the dogs.

Voice from the balcony: Woof, Woof.

"I'm sorry, old man, but I make it a rule never to lend money; it ruins friendship."

"But why let that worry you? We never were what you might call wonderfully good friends, were we?"

He: "Any nice girls in this town?"

They: "Yep. Every one of them."

He: "How far is it to the next town?"

THE UNPREDICTABLE IN PUMPING

A new pumping unit by the best engineers and metallurgists would develop faults that only time and experience could eliminate.

We have that behind us. We are the oldest and largest exclusive manufacturer of pumping equipment in the business. Our experience around the world for 23 years has narrowed down to almost nothing the unpredictable in pumping. JENSEN JACKS are now made to cope with anything. Their economy and efficiency has been a godsend to many California producers. WHY DON'T YOU INVESTIGATE?

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EXPORT OFFICE: 50 Church St., New York City

Field Development

Los Angeles Basin

San Berdu Well Pumping Oil

Municipal Oil Co.'s redrill of the old Mahala Oil & Gas Co. No. 1 on sec. 13, 3s-8w of San Bernardino county has been rewarded with 70 bbl. daily pumped recovery of clean 25 gravity oil. Redrilled to 3804 ft. the well was completed in the interval 3710-3765 ft. and at press time was reported maintaining its 70 bbl. daily average with some natural gasoline recovery expected when traps are installed.

J. E. F. To Start Stanton Wildcat

J. E. F. Oil Co. is rigging up to drill Larson No. 1 in the Stanton area of Orange county. The well is located 100 ft. north and 300 ft. west of the northwest corner of Katella and Park Avenues in sec. 23, 4s-11w.

Shell Finishes Dominguez Well

Shell Oil Co., Inc. finished Reyes No. 93 at plugged depth of 7400 ft. in the Dominguez oil field. Completed in the intervals 7395-7156 and 7121-6936 ft. the well initialed 378 bbls. of 31 gravity clean oil and 1,000,000 cu. ft. of gas through a 56/64 in. bean.

Southwest Completes Huntington Beach Well

Southwest Exploration Co. effected another of its good Tideland area producers in the Huntington Beach field when State No. 48 bottomed at 5352 ft. and came in pumping 272 bbls. of clean 27 gravity oil. The company is drilling No. 49 near 2500 ft. with several additional projects scheduled for immediate work.

Standard Oil Co. is preparing to spud Huntington No. A-39 as is D. D. Dunlap well No. 18 while W. E. Medearis is bailing after landing liner at 2100 ft.

Montebello Well Completed Pumping

Standard Oil Co.'s drilling program in the old Montebello field was again rewarded when No. 95 was completed at 2935 ft. pumping 139 bbls. of 13 gravity oil. The company is drilling No. 97 at 2711 ft. and has graded for Nos. 91 and 96.

Two To Start At Oak Canyon

Two additional projects are under way in the Oak Canyon field near the L. A.-Ventura county line. First to spud will be Western Gulf Co.'s M. A. Gilmour No. 1 which is rigging up near the south quarter corner of sec. 32, 5n-17w. This company also is drilling Vesta B. Wickham No. 1 at 6927 ft. in the same section. The second project will be Hathaway Co.'s Rose Lechler No. 1, a Wickham zone test some 700 ft. north of the company's Ram No. 1. This site is 497 ft. north and 397 ft. west of the center of section 31 of the township and is on lands which Hathaway recently acquired from Western Gulf.

LOS ANGELES BASIN WILDCATS

Area	Well	No.	Section	Depth	Status
Castaic	Young, Roy W., Inc., Walker	1	11, 4-16	9981	Idle
Del Valle	Union Oil Co. N. L. & F.	1	20, 4-17	6757	Drilling
Las Llajas	West'n Gulf Oil Co., Brady	1	13, 3-17	6346	Drilling
L. A. City	Schirm & Rubenstein H-S	1	24, 1-13	3919	Idle
	Shell Oil Co., Inc., Verne Comm.	1	21, 1-14		Location
Newhall	Aztec Oil Co., Sanborn	1	6, 3-16	6894	Idle
	James C. Brazell, Perkins	1	11, 3-16	4473	Idle
	So. Calif. Pet. Corp., Lassalle 44-1		3, 3-16		Location
Potrero	Duquesne Oil Co., Eunice	1	3, 3-14		Rig
Puente	Barry Oil Co. Inc., Roland	1	14, 2-10	2098	Cleaning Out
	The Flintkote Co., Turnbull	1	12, 2-11	2251	Drilling
	Melvin Hansen, Dragna	1	24, 2-10	2840	Idle
Rio Hondo	PotreroOil Co.,Newman	1	32, 1-11	5970	Drilling
Whittier-La Habra	Los Nietos Valley Oil Co., Woodward	1	29, 2-11	3317	Idle
	H. & C. Oil Co., Joyce	1	22, 2-11	4780	Drilling
	Orange County				
Stanton	J E. F. Oil Co., Well	1	23, 4-11		Equipment
	Riverside County				
San Jacinto	Wonder Oil Co., Stroh	1	30, 4-1	2801	Abandoned
	San Bernardino County				
Carbon Canyon	Stella, E. F., McDermont	2	5, 3-8	982	Drilling
	Municipal Oil Co., Mahala	1	13, 3-8	4217	Pumping
Colton	Supreme Oil Co., Well	1	2, 2-4		Rigging up

Coastal District

General Abandons Gato Ridge Well

General Pet. Corp. abandoned Giorgi No. 1 on sec. 13, 8n-32w at 1255 ft. in Franciscan basalt which was entered at 975 ft. Located in Foxen Canyon approximately two miles east of the south tip of the Gato Ridge field, the well sought an accumulation along the same uplift from which the Gato Ridge and Los Flores fields produce.

Not to be disheartened by a miss, the company is building rig to drill Wickenden No. 1 some 2400 ft. to the south on sec. 24, 8n-32w in search of the original objective.

Security Quits Goleta Area Try

Security Land and Royalty Co. abandoned its wildcat on the Santa Barbara County Hospital acreage, sec. 12, 4n-28w, in gray Vaqueros sand at 3290 ft. The operators are reported considering another test on the parcel.

Tide Water Starts 2nd Los Olivos Well

Tide Water Assoc. Oil Co., which recently effected 100 bbl. per day heavy oil production on sec. 33, 8n-31w with Davis No. 1, is preparing to drill Chamberlin No. 1 on the same section in the Los Olivos area. Foundation has been poured 1868 ft. south and 688 ft. west of the northwest corner of the Carranza Mesa Tract.

Barnsdall Finishes Gato Ridge Pumper

Barnsdall Oil Co. completed Tognazzini No. 4 on sec. 4, 8n-32w at Gato Ridge from 3720 ft. Last production was reported as 675 bbls. of clean 12.9 gravity oil per day. The company has received permission to deepen Nos. 6 and 8 on the lease.

Lytle To Test Miocene Sands

R. S. Lytle Elkins No. 1, deep test on sec. 6, 3n-19w at Bardsdale, is preparing to test Miocene sands from the shoe of 9⅝ in. casing cemented at 4808 ft. to plugged bottom at 4915 ft. The try bottomed at 5681 ft. in gray shale and plugged for trial.

C.C.M.O. Redrills Rincon Deep Test

C. C. M. O. Co's 10,065 ft. redrill job, Hobson No. C-10 on sec. 17, 3n-24w, drilled to 9322 ft. where drill pipe stuck on bottom. At last report operators had cut the fish at 7700 ft. and cemented it in place to sidetrack. The company is rigging up to drill No. B-45 some 200 ft. south and 5217 ft. west of the center of section 17.

On the Whitten Permit Honolulu Oil Corp. is drilling No. 56-4 in oil sand at 2575 ft. This well is drilled into the tideland from a pier and employs common surface casing with its three predecessors.

Lytle Starts Edna Area Try

R. S. Lytle, Operator, is rigging up to drill Holmes No. 1 on sec. 6, 32s-13e in the Edna area of San Luis Obispo county. The well is located 3700 ft. south and 461 ft. east of the northwest corner of lot 64 of the Rancho Corral de Piedra.

Tests Scheduled For Conejo Well

L. A. Basin Oil Co. is preparing to make a series of tests uphole from bottom at 1746 ft. in its suspended wildcat on sec 4, 1n-20w. The well will be tried for any possible production above the 1400-1746 ft. in-

COASTAL COUNTIES WILDCATS

Area	Well	No.	Section	Depth	Status
	Santa Barbara County				
Cat Canyon	Bel-Air Oil Co., Williams	1	25, 9-33	6291	Testing
	Standard Oil Co.	SBLC1	15, 9-33	6728	Drilling
Gato Ridge	General Pet. Corp., Giorgi	1	13, 8-32	1255	Abandoned
	General Pet. Corp. Wickeden	1	24, 8-32		Foundation
Goleta	Del Mar Oil Co., Rowe	1	11, 4-28	2341	Drilling
	Security Ld. and Roy. Co. County	1	12, 4-28	3290	Abandoned
Lompoc	Alphonzo E. Bell Corp., Lompoc	6	28, 8-34		Rigging up
	Fickert Oil Co., Ltd., Well	1	8, 7-33		Rig
Los Olivos	Tidewater A. O. Co. Chamberlin	1	33, 8-31		Foundation
	Ventura County				
Bardsdale	Hopland Oil Co., Well	1	1, 3-19	4634	Idle
	Lytle, Robt. S., Opr., Elkins	1	6, 3-19	5681	Testing
	San Marino Oil Co., Elkins	1	7, 3-19		Rig
Conejo	Sycamore Oil Co., Boylan	1	23, 1-20	2747	Idle
Eureka Canyon	El Rika Oil Co., Well	3	33, 4-18	417	Bailing
Ojai	Coates, Spencer D., Pirie	5	7, 4-22	1033	Idle
Piru	Continental Oil Co., Holser	2	14, 4-18	1541	Drilling
	Delroy Pet. Corp., Fisk C. H.	1	22, 5-18	2705	Redrlg.
	Pac. West. O. Corp. Temescal	15	4, 4-18	217	Drilling
	T.W.A. Oil Co., Hidden	2	5, 4-18	711	Drilling
Santa Paula	J. J. Stevens, Corehole	1	31, 4-20	1102	Abandoned
Sespe	McCaslin, W. E., Burson	1	19, 4-19	2039	Idle
	Volunteer Pet. Co., Tar Creek	3	28, 5-19	325	Fishing Tools
Timber Canyon	Crude Oils, Inc., West	1	19, 4-20	958	Idle
	Fletcher & Babcock O'Leary	1	29, 4-20		Location

NORTHERN COUNTIES WILDCATS

County	Well	No.	Section	Depth	Status
Butte	Pac. West'n & Getty Cana	1	11,23n-1w	2368	Drilling
	Superior Oil Co., DodgeLand	1	30,20n-1e	3420	Drilling
Contra Costa	Standard Oil Co., Jordan Unit	1	29, 3n-3e		Grading
Monterey	Loma Grande Oil Co., Corey	1	23,24s-10e	4318	Idle
	Columbia Oil Co., Vierra	1	7, 13s-2e		Rig
San Benito	Union Oil Co., Friedman	1	13, 16s-12e	6370	Fishing
San Joaquin	Standard Oil Co., Blewett Com.	3	23, 3s-6e		Rig
San Luis Obispo	W'n Gulf Oil Co., Huasna Comm	1	35, 31s-14e		Grading
	R. S. Lytle Opr. Holmes	1	6, 32s-14e		Rigging up
Solano	Standard Oil Co. Fontana Farms	1	23, 3n-1w		Grading
	Standard Oil Co., Suisun Com.	1-2	36, 4n-2w	6007	Fishing
	Standard Oil Co., Suisun Com.	2-1	25,3n-1w	7300	Fishing
Tehama	The Texas Co., Walbridge	1A	32,28n-2w	1498	Suspended

terval, which tested wet on previous trial, before being officially abandoned.

Union Yet Works Ciervo Wildcat

Union Oil Co.'s wildcat in the Ciervo area of San Benito county, Friedman No. 1 on sec. 13, 16s-12e, is fishing drill pipe from 6182 ft. after bottoming at 6370 ft. The well is reported planning to test sands cored from 6193 to 6315 ft. which showed good cut and odor.

Seaboard Drilling Shiells Canyon Try

Seaboard Oil Co. is drilling a deep test on sec. 10, 3n-19w in the Shiells Canyon field on lands acquired from the Security Exploration Co. which has nearby shallow production. The well, Seaboard-Calumet No. 1, is drilling below 2100 ft. and is planning to core from 2200 ft.

Engineering, Technology, latest news—twice a month in California Oil World.

Additional Basin

4th Well Finished In Turnbull Canyon

Continental Oil Co. completed Turnbull Comm. No. 4, sec. 13, 2s-11w, at 4070 ft. flowing through 546 ft. of perforation at an average 290 bbl. rate cutting some 18.0% mud. The company is at present acidizing in an effort to better the flow of 26 gravity oil.

At the northern end of the canyon The Flintkote Co. wildcat, Flintkote-Turnbull No. 1, sec. 12, 2s-11w, is drilling in siltstone at 2251 ft.

Coyote Well Seeks Water

Batholomae Oil Corp.'s deep test of the East Coyote field, Stern No. 12 on sec. 22, 3s-10w, is attempting to locate water after landing liner on a plug at 6480 ft. and testing wet. The well bottomed at 9500 ft. in barren Sespe formation and plugged back to produce the customary Puente sands.

Stark Fox Joins the Navy

Stark Fox, who has been associated with Oil Producers Agency of California for the past five years, and with the Conservation Committee of California Oil Producers for the past two and a half, has been appointed a Lieutenant, junior grade, United States Naval Reserve, and reported at Quonset Point, Rhode Island, on December 22 for training for administrative duties in the Navy's Air Arm.

During the past five years, Mr. Fox has served on many committees of oil men in a secretarial capacity, and has been public relations representative for Oil Producers Agency and the Conservation Committee.

Mr. Fox is a Stanford graduate and resides at 1124 Oak Grove Drive, Los Angeles.

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San Joaquin Valley

General Quits Round Mt. "Cat"

General Pet. Corp. Bishop No. 1, in the southwest corner of sec. 14, 28s-28e of the Round Mountain area, is abandoned at 2990 ft. At what point the objective Vedder was found barren is yet to be determined since the operator has to date released no information on formation encountered.

Evidence that the company believes in the possibility of additional discoveries in this area is found in the fact that the company is now preparing to drill Tarabino No. 1 some 300 ft. south and west of the east quarter corner of sec. 6, 29s-29e.

Richfield Starts Kern Front Well

Richfield Oil Corp. is preparing to drill a Kern Front area wildcat, M & K Fee No. 1, 990 ft. south and 1650 ft. west of the northeast corner of sec. 33, 28s-27e. This test lies approximately a half mile west of Kramer No. 1 which the company drilled to basement at 7738 ft. in the fall of 1941. This well found some poor oil sands near 2400 ft., the barren Vedder at 6200 ft. and gray Eocene near 7200 ft. only to enter granite at 7724 ft. and abandon.

Tide Water Seeks New Production

Tide Water Assoc. Oil Co. is preparing to drill De Pauli No. 78-19 northwesterly from the Premier Pool production in Kern county. The test, now rigging up, is located 330 ft. north and 990 ft. west of the southeast corner of sec. 19, 27s-27e in what is called the McVan area.

Mendota Try Coring Ahead

The Texas Co.'s Gill No. 38-16, sec. 16, 13s-16e in Madera county, is coring below 4485 ft. after having entered the Kreyenhagen at 4210 ft. The try is near previous attempts at production in the area slightly north of, and midway between, the towns of Mendota and Kerman.

Second Test For DiGiorgio Corp.

Di Giorgio Fruit Corp. is preparing to drill a second test on sec. 12, 31s-29e in the Mountain View area, approximately a half mile southwest of DiGiorgio No. 1 which abandoned at 2271 ft. after entering granite at 2080 ft. The well cored silty oil stained sands unworthy of testing in the Kern River Series below 1250 ft.

Amerada Finishes Riverdale Well

Amerada Pet. Corp. completed Mathias No. 36-15, sec. 15, 17s-19e, in the intervals 6840-50, 6820-30, and 6780-6800 ft. flowing 499 bbls. of clean 37.8 gravity oil and 264,000 cu. ft. of gas through a 12/64 in. orifice. The operator is rigging up to drill Young No. 74-16—is making hole at 3000 ft. on Courtney No. 2-23 while completing Alves No. 32-22, Zanolini No. 36-23 and Leal No. F-21-26 all near the 6900 ft. mark.

Reserve Cores For Oil Zone

Reserve Oil & Gas Co.'s attempt to find an accumulation near the Grapevine in the southern San Joaquin Valley, Reserve No. 34-1 sec. 34, 11n-19w, is coring for the Reserve zone below 3800 ft. after coring Santa Margarita sands in several intervals below 3580 ft. The current driller, northeast of small production found in the area, seeks production indicated in earlier efforts, the nearby presence of which is conceded by many field geologists.

Pipe Planned For Nicholson Wildcat

Field reports indicate that the Shell-Standard Oil Co. joint test, Henderson No. 66-22 in sec. 27, 15s-15e, will soon be cased for protection. The try is at present reported reaming at 9992 ft. preparatory to setting 9⅝ in. casing near 9000 ft. Little information concerning findings has been released on this well but it is believed that Cretaceous was entered near 7900 ft.

SAN JOAQUIN VALLEY WILDCATS

Area	Well	No.	Section	Depth	Status
	Fresno County				
Coalinga	The Texas Co.	83-18	18, 21-15	3615	Drilling
	Lytle, Robt. S., Opr., Lobre	43-24A	24, 19-15		Rig
Guijarral Hills	Standard Oil Co., Well	82-29F	29, 20-16	8610	Drilling
Nicholson	Shell-Standard, Henderson	66-22	27, 15-15	9992	Reaming
	Kern County				
Comanche Point	Miesse, R. S. Ham Johns	2	32, 12-18	850	Idle
Cymric	R. S. Lytle, Well	1	20, 29-21		Location
	C. M. Morse, Well	1	13, 29-21		Location
Devils Den	Continental Oil Co., Mabry	3	26, 26-18	4397	Drilling
Dyer Creek	D. D. Dunlap, Dyer Creek	1	11, 26-27	944	Idle
Edison	Republic Pet. Co., Portals	2	5, 30-29	2916	Drilling
Jasmine	Calif. Oil Co., Quinn	3	15, 25-27	2926	Idle
Kern Front	Richfield Oil Corp. M & K Fee	1	33, 28-27		Location
McFarland	T.W.A. Oil Co., Strine	35-15	15, 26-26	5150	Drilling
McKittrick	MacVee Assoc., Well	1	33, 29-21	1137	Abandoned
McVan	Tidewater A. O. Co. DePauli	78-19	19, 27-27		Rigging up
Midway-SE.	The Texas Co., P.U.P.	2	33, 11-23	8763	Drilling
Mt. View	DiGiorgio Fruit Corp., Well	1	12, 31-29	2271	Abandoned
	DiGiorgio Fruit Corp., Well	2	12, 31-29		Location
Reserve	Reserve O. & G. Co., Well	34-1	34, 11-19	3730	Drilling
Round Mt.	Gen. Pet. Corp., Bishop	1	14, 28-28	2668	Foundation
	Gen Pet. Corp., Tarabino	1	6, 29-29		Location
	Harp & Brown, Olcese	1	17, 28-29		Rig
	Iseminger Bros., Well	1	8, 30-26	331	Idle
Strand	T.W.A.O. Co., KCL	56-8	2, 28-28	8351	Deepening
	Madera County				
Mendota	The Texas Co., Gill	38-16	16, 13-16	4485	Drilling
	San Luis Obispo County				
Midway, NW.	C.C.M.O. Co., Thomas	1	1, 31-21	6192	Drilling
	C.C.M.O. Co., Well	25-1	1, 32-22	4473	Drilling
	Tulare County				
Tulare Lake	Shell Oil Co., Inc., T.S.G.	21-28	28, 22-20		Rigging up

Utilized Block Assemblies Feature Compactness

Two Unitized Block Assemblies recently developed by the Baash-Ross Tool Company of Los Angeles bring a new standard of compactness and adaptability to modern portable rig operations. These assemblies combine both the block and hook into one compact, streamlined unit, thus saving much valuable space over the separate block-plus-hook arrangement generally used. By decreasing the space required for hook and block, they substantially increase the effective working height of portable rigs. They permit pipe to be brought out of the hole faster, without risk of running into the crown . . . they greatly speed up floor operations by the increased working room they provide . . . and they also increase the safety and convenience of portable rig operations.

Two Types

Baash-Ross Unitized Blocks are available in two types—either with spring loaded hook or with spring loaded link adapter—to meet a wide range of portable well-pulling and slim-hole drilling requirements.

(Right) BAASH-ROSS UNITIZED BLOCK WITH LINK ADAPTER ASSEMBLY

(Above) BAASH-ROSS UNITIZED BLOCK WITH HOOK ASSEMBLY
(Inset at right shows Hook open with view of Automatic Latch)

Hook Asssembly

The block with spring loaded hook is similar to the conventional hook-plus-block assembly, but is far more compact through the elimination of the space normally required for Block and Hook bails. The Hook is free-swivelling, but when desired, can be quickly locked in any one of four positions by means of a built-in locking pin.

An automatic latch is provided for locking the Hook in closed position —an important safety feature in rough drilling operations—and when open, this latch also acts as a guide for picking up the swivel bail.

Link Adapter

Where maximum compactness is desired, the Link Adapter Assembly is recommended. With this assembly the elevator links are suppported on ears provided on the side of the Link Adapter body and are locked in place by bolts. This unit, like the Hook unit, is spring-loaded and free swivelling, and can be locked against rotation in any one of four positions by means of a built-in locking pin. It is available with or without a bottom clevis bail for handling rod hooks and similar equipment.

Both block units are completely streamlined with all bolts recessed into the body where they cannot catch on rig projections or clothing. Many other advanced features are incorporated in the design of the Baash-Ross Unitized Block Assemblies to increase their convenience, safety and efficiency.

Nine Sizes

Each of the two types of Unitized Block Assemblies is available in nine sizes—a range wide enough to meet the requirements of practically any portable rig job. Each type of block is available in one, two or three-sheave models (capacities 30, 60, and 100 tons, respectively) and each of these models is available with 20″, 24″, or 30″ sheaves.

Full information on these compact and highly efficient Unitized Block Assemblies can be obtained by writing direct to Baash-Ross Tool Co., 5512 Boyle Avenue, Los Angeles, California.

Columbia Steel Pittsburgh Plant Presented "E" Award

Rear Admiral W. L. Friedell, Commandant of the Mare Island Navy Yard, presented the Army-Navy "E" award to employees of Columbia Steel Company at the company's Pittsburgh works, December 19.

The coveted award, which signifies excellence in production, was presented at ceremonies held publicly in the Sheet and Tin Mill parking area, an open-air site adjacent to the company's Pittsburgh works.

Participating in the presentation ceremonies were high ranking Army and Navy officers, the Camp Stoneman band, a U. S. Marine Corps color guard, civic leaders, and Columbia Steel Company employees.

W. A. Ross, president of Columbia Steel Company, accepted the award in behalf of employees.

Prior to the presentation ceremonies, military and naval officers and civic leaders attended a luncheon at the Los Medanos Hotel in Pittsburgh.

Following the luncheon, a tour of the Pittsburgh works, conducted by J. A. White, superintendent, was made by the visiting guests.

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